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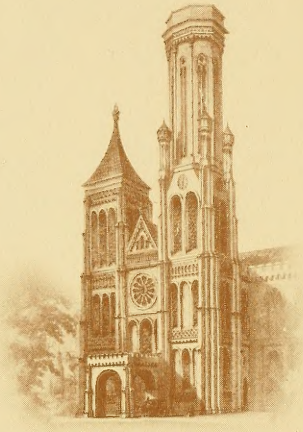

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CONTENTS

	Page
The Influence of Submarine Cables upon Military and Naval Supremacy ; by GEORGE O. SQUIER	1
The Indian Tribes of Southern Patagonia, Tierra del Fuego, and the Adjoining Islands ; by J. B. HATCHER	12
Location of the Boundary between Nicaragua and Costa Rica ; by ARTHUR P. DAVIS	22
The Nicaragua Canal	28
The Tsangpo ; by JAMES MASCARENE HUBBARD	32
Recent Contributions to our Knowledge of the Earth's Shape and Size by the United States Coast and Geodetic Survey ; by C. A. SCHOTT	36
Explorations in Central East Africa	42
Geographic Notes	44
The Principles Underlying the Survey of the Bottom of the Ocean for an All-American Trans-Pacific Cable to the Philippines and the Orient ; by E. W. LITTLEHALES	48
An Around-the-World American Exposition ; by O. P. AUSTIN	49
The Causes that Led up to the Siege of Pekin ; by W. A. P. MARTIN	53
Singan—the Present Capital of the Chinese Empire ; by JAMES MASCARENE HUBBARD	63
The Midnight Sun in the Klondike ; by ALICE ROLLINS CRANE	66
The Northern Lights ; by ALICE ROLLINS CRANE	69
Japan and China—Some Comparisons ; by HARRIE WEBSTER	69
Geographic Notes	77
Death of Colonel Hilder ; [W J McGEE]	85
The Origin of Yosemite Valley ; by HENRY GANNETT	86
Geographic Names	87
Proceedings of the National Geographic Society	88
Abyssinia—The Country and People ; by OSCAR T. CROSBY	89
The Old Yuma Trail ; by W J McGEE	103
The Sea Fogs of San Francisco	108
Geographic Facts from Report of the Taft Philippine Commission	114
The Philippine Exhibit at the Pan-American Exposition ; by D. O. NOBLE HOFFMAN	119
Geographic Notes	123
Geographic Literature	126
Proceedings of the National Geographic Society	127
The Old Yuma Trail (continued) ; by W J McGEE	129
Advances in Geographic Knowledge during the Nineteenth Century ; by A. W. GREELY	143
Mexico of Today ; by DON JUAN N. NAVARRO	152
Geographic Notes	158
Geographic Literature	165
Proceedings of the National Geographic Society	166
The Latin-American Constitutions and Revolutions ; by JOHN W. FOSTER	169
Mexico of Today (continued) ; by DON JUAN N. NAVARRO	176
The General Geography of Alaska ; by HENRY GANNETT	180
George M. Dawson ; [HENRY GANNETT]	197
Geographic Notes	199
Geographic Literature	207
Proceedings of the National Geographic Society	208

Page

China : Her History and Development ; by JOHN BARRETT 209
The Dikes of Holland ; by GERARD H. MATTHES 219
Mexico of Today (concluded) ; by DON JUAN N. NAVARRO 235
Sir John Murray 238
Geographic Notes 240
Geographic Literature 248
The Link Relations of Southwestern Asia ; by TALCOTT WILLIAMS 249
China : Her History and Development (concluded) ; by JOHN BARRETT 266
The Indian Village of Baum ; by H. C. BROWN 272
The Geography of Abyssinia ; by AUGUSTUS B. WILDE 274
Oil Fields of Texas and California 276
The Seri Indians 278
Asia, the Cradle of Humanity ; by W J McGEE 281
The Link Relations of Southwestern Asia (concluded) ; by TALCOTT WILLIAMS 291
The Old Post-road from Tiflis to Erivan ; by ESTHER LANCRAFT HOVEY 300
Joseph Le Conte ; by W J McGEE 309
Mount McKinley ; by ROBERT MULDROW 312
Geographic Notes 313
Siberia ; by Prof. EDWIN A. GROSVENOR 317
German Geographers and German Geography ; by MARTHA KRUG GENTHE 324
The Drift of Floating Bottles in the Pacific Ocean ; by JAMES PAGE 337
The British Antarctic Expedition 339
Urban Population of the United States 345
Geographic Notes 347
Next International Geographical Congress to be Held in Washington ; [GILBERT H. GROSVENOR] 351
Peary's Work in 1900 and 1901 357
The Weather Bureau ; by WILLIS L. MOORE 362
Work of the Bureau of American Ethnology ; by W J McGEE 369
Boundaries of Territorial Acquisitions 373
The German South Polar Expedition ; by GEORG KOLLM 377
National Geographic Society Calendar, 1901–1902 379
Geographic Notes 380
The Sex, Nativity, and Color of the People of the United States; [GILBERT H. GROSVENOR]. 381
A Remarkable Salt Deposit ; by CHARLES F. HOLDER 391
Sven Hedin's Explorations in Central Asia 393
Recent Discoveries in Egypt 396
Kodiak not Kadiak ; [MARCUS BAKER] 397
Origin of the Name "Cape Nome ;" by GEORGE DAVIDSON 398
Geographic Notes 399
Geographic Literature 409
National Geographic Society Program of Lectures and Meetings 411
Diary of a Voyage from San Francisco to Tahiti and Return, 1901 ; by S. P. LANGLEY ... 413
The Lost Boundary of Texas ; by MARCUS BAKER 430
Ice Caves and Frozen Wells ; by W J McGEE 433
Western Progress in China 434
Geographic Notes 436
Geographic Literature 442
National Geographic Society 448
Index 449

ILLUSTRATIONS

	Page
Channel Indians of the west coast and western part of Strait of Magellan	15
Tehuelche tent	17
A Tehuelche brave—twenty-five years of age	19
Tehuelche squaw	21
A. P. Davis	25
Map showing the boundary between Nicaragua and Costa Rica	27
Map showing route of Nicaragua Canal as proposed by Isthmian Canal Commission	29
Traveling in Nicaragua	30
Natives of Nicaragua	31
O. H. Tittmann	37
Map of the earth on Mollweide's equivalent or homolographic projection	39
Lieut. Franco Querini	44
Map of a suggested route for a Floating Exposition	51
Old gate in city of Pekin	61
Suchau Creek at Shanghai	62
Midnight Sun, Dawson, June, 1900	67
Northern lights	68
An execution in Pekin	75
Rock Temple at Amoy	76
Hon. O. P. Austin	80
Colonel F. F. Hilder	84
Morning fog over valleys	109
Lifted fog	110
Summer sea fog pouring over Sausalito Hills and through Golden Gate	111
Fog waves	112
Fog billow	113
Evelyn B. Baldwin	118
Geographic mapping of the United States	122
The Santo Domingo of today	130
A cactus-dotted plain revealing its origin in occasional projecting bosses of granite	131
Map showing the country of the old Yuma trail	132
A tongue of the Red Desert	135
Looking down on threescore cross-marked graves	138
The lowest and largest is confined partly by great boulders and granite débris	139
The turreted volcanic mass christened "Klotho's Temple" by Mr. Gill	140
Plains still mantled with herbage and grazed by herds of deer as in pre-Columbian times	142
Map showing the world at the end of the XVIII century	151
Map showing the world at the end of the XIX century	151
End of Columbia Glacier, College Fiord	185
Amherst Glacier, College Fiord	186
Juneau	187
John Muir	188
An Indian totem	189
Eskimo at Plover Bay, Siberia	190
Eskimo at Plover Bay, Siberia	191

Page

Mt. Paulof, Alaska Peninsula ... 192
Henry Gannett ... 195
George M. Dawson ... 197
George Davidson ... 198
Map showing the Netherlands during the first century ... 219
Diagram showing the Netherlands of today and the State of Ohio compared ... 220
Map showing successive enlargements of Haarlem Lake ... 223
Map showing Zeeland about the year 1200 ... 225
Three diagrams showing the enlargement of one small mud flat to ten times its original size ... 226
Forest growth on the Dunes ... 228
The Dunes near Domburg, in the Province of Zeeland ... 229
Diagram showing normal monthly precipitation in Amsterdam, Omaha, Sacramento, Washington ... 231
Pile dikes for protection against marine erosion ... 232
Flood chart showing condition of Holland without dikes ... 233
Sir John Murray ... 239
Relief sketch map of Eurasia—Lambert's projection ... 251
Map—villes sur la surface du globe ... 252
The continental core of Asia ... 253
Map showing arid regions and closed basins of Asia ... 254
Map showing the Mediterranean basin ... 255
Map showing distribution of Atlantic and Pacific Coast types ... 256
Map showing distribution of rainfall on earth's surface ... 258
Map showing climatic divisions ... 259
Map showing the vegetable kingdom ... 260
Map showing "die morphologischen Hauptgebiete der Erde" ... 261
Map showing the races of mankind before the European invasion ... 263
Map showing the interrelation of the races ... 264
Map showing trade routes from the East to Egypt ... 293
Map showing the Roman Empire ... 299
Our guard of mounted Cossacks ... 301
The mountains, looking northeastward from the Pass of Delijan ... 302
The village of Semenovka ... 303
At Jélénovka ... 304
An Armenian household ... 305
The ancient mosque at Erivan ... 306
A study in rags ... 306
The village of Nijhi Akhty on the lava plain ... 307
The village threshing floor at Jélénovka ... 308
Joseph Le Conte ... 310
Map showing Mt. McKinley ... 312
Alexander Graham Bell, LL. D ... 353
W J McGee, LL. D ... 354
Gen. A. W. Greely, U. S. Army ... 355
Hon. Seth Low ... 356
Lieut. Robert E. Peary ... 359
Mrs. Josephine D. Peary ... 360
Map showing the boundaries of territorial acquisitions ... 375
Diagram showing the percentage of native and foreign born in all States and Territories having at least one per cent of their population foreign born ... 384

Page

Diagram showing percentage of whites and negroes in certain States at each census, 1790–1900 386–387
Ploughing up the salt in the sea of Salton 390
Piles of salt at Salton, 280 feet below the level of the ocean 392
Map showing position of Tahiti in mid Pacific 413
Gathering cocoanuts 416
Map of Tahiti 418
Robinson Crusoe hut 419
Crossing a ford 420
Landing 421
Cook Island chief 422
The road to Point Venus 423
Cook Islanders 424
The pile of stones ready for the fire walk 425
The aids began to turn the stones with long, green poles 426
Papa-Ita began to walk through the middle hurriedly 427
Map showing Clark's survey (Texas boundary) 431
Diagram showing literacy of the men of the United States 437
Map of Siberian Railway 438

THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. XII JANUARY, 1901 No. 1

CONTENTS

PAGE

THE INFLUENCE OF SUBMARINE CABLES UPON MILITARY AND NAVAL SUPREMACY. BY GEORGE O. SQUIER, CAPT. SIGNAL CORPS, U.S.A. 1

THE INDIAN TRIBES OF SOUTHERN PATAGONIA, TIERRA DEL FUEGO, AND THE ADJOINING ISLANDS. BY J. B. HATCHER. ILLUSTRATED 12

LOCATION OF THE BOUNDARY BETWEEN NICARAGUA AND COSTA RICA. BY ARTHUR P. DAVIS, CHIEF HYDROGRAPHER, ISTHMIAN CANAL COMMISSION. ILLUSTRATED 22

THE NICARAGUA CANAL. ILLUSTRATED 28

THE TSANGPO. BY JAMES MASCARENE HUBBARD . . . 32

RECENT CONTRIBUTIONS TO OUR KNOWLEDGE OF THE EARTH'S SHAPE AND SIZE, BY THE UNITED STATES COAST AND GEODETIC SURVEY. BY A. C. SCHOTT. ILLUSTRATED 36

EXPLORATIONS IN CENTRAL EAST AFRICA 42

GEOGRAPHIC NOTES. ILLUSTRATED 44

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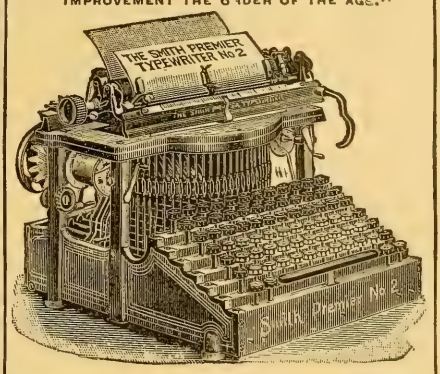

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE INFLUENCE OF SUBMARINE CABLES UPON MILITARY AND NAVAL SUPREMACY

By George O. Squier, Capt. Signal Corps, U. S. A.

THE accidental non-delivery of two cable messages from the Minister of Marine (Bermejo) to the Commander-in-Chief of the Spanish Squadron (Cervera) at Martinique, undoubtedly largely changed the whole history of the Spanish-American War.

One of these telegrams informed him of coal supply near at hand, and the other granted him permission to return at once, with his squadron, to Spain.

Admiral Cervera's firm stand against the despatch of the Spanish squadron from the coast of Spain to West Indian waters is heroically and almost pathetically shown in the recent publication, by permission of the Queen Regent, of the official despatches. At Cape Verde, and before and after, by cable and by letter, he points out the unpreparedness of his squadron, and predicts its certain destruction if it proceeds. Knowing his strong views, it is probable that he would have lost no time in coaling and starting back to Spain.

With Cervera's squadron returned to Spain there would have been no Santiago campaign, the Flying Squadron would probably have been sent to the coast of Spain, and the land operations in Cuba directed against Havana.

Cervera's fleet not eliminated, who can say how long Spain may not have been able to resist, and what additional blood and treasure the struggle may have cost the United States.

The story of the Spanish-American War is largely a story of "coal and cables." That war for the first time demonstrated the dominating influence of submarine cable communications in the conduct of a naval war. As a result of it the principal maritime powers, with colonial possessions, are each at present elaborating their "cable policy," and have awakened to a realization of the fact that reliable submarine communications under exclusive control are not only absolutely necessary, but exercise a dominating influence upon the control of the seas, whether in commercial strategy or in military and naval strategy.

A modern war between two naval powers has reduced itself largely to a war of "coal and cables."

At present the submarine telegraph is

a powerful instrument of war, more powerful, indeed, than battleships and cruisers, since by its wonderful and instantaneous communications of thought, it brings distant countries and colonies together in sympathy, which is the only true and permanent tie.

ELECTRICITY THE IDEAL MEANS OF TRANSMITTING INTELLIGENCE.

The triumphs of science in the last half century have been nowhere more exemplified than in the enormous strides made in the facility of transmitting intelligence. The mails, the telegraph, and the telephone are civilizing the world. Perfect as is the mail system of to-day, a monument to organization, yet its swiftest messenger—steam—is so far outstripped, either on land or sea, by the practically instantaneous electric current, that the tendency, year by year, is to put more of the world's business "upon the wire."

Time has an international money value in trade, and a paramount strategic value in war. The fastest mail express, or the swiftest ocean ship, are as naught compared with the velocity of the electrical impulse which practically annihilates any terrestrial dimension. As the distance increases, electricity surpasses steam in a continuously increasing ratio. A message is to be sent half way around the earth; the minutes required by the telegraph run into weeks and months by the slow process of the mails. Steam time is directly a function of the distance to be traversed, and from the nature of things is twice as long for two miles as for one. If, then, the cable saves six days between Europe and America, it will save more than twice this time between America and the East, and is, from this point of view, correspondingly important and necessary. Since electricity so far outstrips any other known vehicle for transmitting intelligence, it must eventually carry all the most important of the world's information.

Strategy has been defined as "the science of combining and employing the means which the different branches of the art of war afford, for the purpose of forming projects of operations and of directing great military or naval movements; the art of moving troops or ships so as to be enabled either to dispense with a battle or to deliver one with the greatest advantage and with the most decisive results."

It is believed that the more the foundations of successful strategy are analyzed, both as the science of conceiving military plans and as an art of executing the same, the more it will become clear that the strategist who is possessed of the most efficient and reliable means of obtaining and communicating information, both of the enemy and his own forces, will have a paramount and insuperable advantage.

Maritime nations are at present beginning to realize that it is not ships and coaling stations alone which measure maritime strength, but also reliable and efficient means of directing, concentrating, supplying, or withdrawing those ships upon the great chess-board of the sea.

As a means of communication over great distances at sea nothing compares, at the present state of practical science, with the submarine cable. The nation with exclusively controlled submarine communications, not possessed by an adversary, has an organized service of surveillance which is not only important during actual war, but which may and will prove a powerful weapon in the diplomatic and preparatory conflict which always precedes a declaration of war, and these communications are a means of securing a first *real* victory, even before war has been formally declared.

It may be said, therefore, *that the very foundation of successful naval strategy is efficient and exclusively controlled communications, and the lack of them more serious than inferior ships.*

THE IMPERIAL CABLE SYSTEM OF GREAT BRITAIN.

As soon as the possibility of communicating at long distance, by means of submarine cables, was practically demonstrated, England saw what commercial and political preponderance the creation of a great network of cables, resting under her control, would give her. Without letting herself be discouraged by heavy losses in the beginning, with a perseverance worthy of admiration, she has succeeded in creating and developing, methodically and without delay, a network of submarine telegraphic cables, which to-day encircles a large part of the entire world.

The English cables, up to the present, have been laid principally by private companies, but Article 7 of the conditions which govern them provides that all official despatches shall have precedence over others; Article 3, that the companies can have no foreigners among their employees, nor can the wires pass into a foreign office, nor under the control of a foreign government; and Article 9, that in case of war the government can occupy the different stations and place its own employees therein.

During the past two years, however, there has been a great national protest in England and the colonies against the exorbitant rates imposed by the monopoly of the private cable corporations, until the principle of absolute state ownership has come to be a controlling one in England's future cable policy.

England's sea-power is not alone measured by the number, character, and tonnage of her war-ships. It is immensely increased by the system of exclusively controlled submarine cable network, which at present forms four-fifths of all the cables in the world, woven like a spider's web to include all her principal colonies, fortified ports, and coaling stations.

Submarine cable communication is scarcely fifty years old, yet the British Empire is already bound together in one vast intelligence, transmission system, with London as its centre. Nothing important can happen in any quarter of the globe which does not find its way to this great world's news exchange—London. And this system is and has been a principal element of her strength and has largely made possible a government including subjects naturally widely differing in character, habits, and modes of thought.

This great cable system is the more important since no other country has such a system, and this fact has placed in the hands of the British Empire a powerful means of real dominion over the rest of the world. Nor is England satisfied with her present extensive telegraph system of world control; she has in projection for the very near future an extension of this system, which will be nothing less than a British imperial telegraph system encircling the entire globe.

It was early discovered by every country in Europe that so efficient and valuable a servant to trade and commerce, so important an aid to the state itself as the telegraph, should become a national institution. Great Britain, France, Austria, Prussia, Russia, Sardinia, Italy, Spain, Portugal, and Belgium, each established a state telegraph system. Thirty years ago the English telegraph lines were transferred to the state, and experience has shown that this has been done with advantage to the state itself and to the benefit of the public. At the present moment the British Empire is advancing rapidly to the accomplishment of a state controlled cable system. Imperial penny-postage having been recently realized throughout the British Empire, the next great step in imperial development along this line is to connect the state-owned land telegraph systems of the Empire by a state-owned and controlled system of submarine cables.

An essential and necessary condition

which has guided in the conception and realization of this cable system has been that none of the lines shall touch foreign soil. So important has been this principle in the proposed British-Pacific cable that we find Great Britain, for some years past, anxiously negotiating for sovereignty over an insignificant island in the Hawaiian group upon which to land her proposed cable to Australasia; and, failing in this, we find her boldly ready to lay a single span of cable of over 3,500 nautical miles in length from Vancouver to Fanning Island, for the sole imperial reason that the cable shall touch only soil exclusively owned and controlled by Great Britain. This principle will be bought in this case at the price of permanently placing at a disadvantage British cable traffic in the Pacific; since, as will be pointed out later, the United States, by the annexation of the Hawaiian Islands, can reach the East across the mid-Pacific by cables having no single span longer than the present Atlantic cables, and yet adhere to the same principle of landing only on territory belonging to the United States.

BRITISH-PACIFIC CABLE.

England at present has direct telegraphic connection with Vancouver with wires independent of any foreign power. Practically all of the Atlantic cables landing at Newfoundland or Nova Scotia from the coast of Ireland are under British control, and, in connection with the Canadian Pacific telegraphic lines, therefore furnish England with direct communication to the west coast of North America.

The proposed British-Pacific cable has been prominently before the British Government as an imperial measure for a number of years. It has been the subject of colonial conferences and of exhaustive research by a Pacific Cable Commission. Its construction is now assured beyond a reasonable doubt. The route from Vancouver is to Fanning Island, thence to Fiji Island, thence to Norfolk Island, and from thence by two branches to New Zealand, and the eastern coast of Australia. The land lines of Australia would then complete telegraph connection with the western coast.

In the Indian Ocean it is proposed to connect West Australia to Cocos Island, and thence to Mauritius, and from thence to Natal and Cape Town. Cocos Island is further to be connected with Singapore by a branch cable. Singapore is already in connection with Hong Kong by an all-British cable. Another branch is also proposed from Cocos Island to Ceylon. At Mauritius a connection would be formed with the existing cable at Seychelles, Aden, and Bombay. In the Atlantic Ocean, in order to avoid the shallow seas along the west coast of Africa, Spain, Portugal, and France, a cable from Cape Town, touching at St. Helena, Ascension, and mid-ocean stations, and extending to Bathurst, which is already connected by existing cables to Gibraltar, has been laid within the last few months. Its construction was hastened after the outbreak of the Boer war to furnish an alternate British route to South Africa by the West Coast. It is further proposed to extend the cable from Ascension to the British Island of Bermuda, perhaps touching at Barbados as a mid-ocean station. At Bermuda a connection would be formed with the cable already existing at Halifax, and that point with the Canadian and trans-Atlantic lines. The extension of the above cables in the Pacific, the Indian, and the Atlantic oceans would involve the expenditure of something like £6,000,000 sterling and the laying of about 23,000 knots of new cable. With the equipment and experience which Great Britain has had in cable-laying, these new cables can be manufactured and laid by England in an incredibly short time, and there can be little doubt but that this extension of British cables, if not along the exact line above specified, yet with slight variations

will be an accomplishment of the near future.

With this extension of imperial cable added to her already extensive state-owned land-line system, England will have the most complete telegraphic system in existence, placing the following fortified and garrisoned coaling stations in direct connection each with any other, viz.: Hong Kong, Singapore, Trincomalee, Colombo, Aden, Cape Town, Simons Bay, St. Helena, Ascension, Saint Lucia, Jamaica, Bermuda, Halifax, Esquimalt, King George's Sound, and Thursday Island. The following "defended ports" would likewise be connected, viz.: Durban, Karachi, Bombay, Madras, Calcutta, Rangoon, Adelaide, Melbourne, Hobart, Sydney, Newcastle, Brisbane, Townsville, Auckland, Wellington, Lyttelton, and Dunedin.

With the completion of the cable across the Pacific the last telegraphic gap will be completed around the earth. Great Britain will then have the great advantage of duplicate routes, since from any point there will be two routes—one east and one west—to any other station.

PROPOSED COLONIAL TELEGRAPH SYSTEM FOR THE UNITED STATES

Since the events of the Spanish-American War the supreme importance of exclusively controlled communications, as a means of military and naval warfare, has been recognized as never before. All the principal nations are studying this subject in its various aspects, and already a distinct cable policy is entering into the politics of the principal countries possessing colonies and seeking for commercial, military, and naval supremacy.

In this connection it may be of interest to note briefly what has been the telegraph policy of the United States in dealing with the territory of our new possessions. In Cuba and Porto Rico, and in the Philippine Archipelago, every effort has been made by the Signal Corps of the Army to cover the islands with a network of wires, so complete and reliable that intercommunication is insured at all times. In the pacification of Cuba and Porto Rico, in the suppression of the Philippine uprising, it is believed that there has been no more potent agent than the military telegraph.

For years Spain had been trying to pacify the Island of Cuba, and yet her telegraph system was incomplete, obsolete, and unreliable in the extreme. It was possible for bands of insurgents to move about much at their pleasure, appearing here and there, with no means of locating or concentrating for their destruction. It was not that the number of troops was not sufficient, so much as that there were no efficient means of directing the troops in such a way as to make results decisive.

TELEGRAPH SYSTEM IN CUBA AND PORTO RICO.

Since the evacuation of Cuba by Spanish troops the land telegraph system has been entirely reconstructed by the United States Signal Corps, and now aggregates about 2,500 miles, including a central trunk line the entire length of the island, which is duplicated from Havana to Sancti Spiritus. In addition to this trunk line there are thirteen lines across the island, which divide it up into comparatively small sections. Every mile of these lines has been reconstructed, under great difficulties, yet their reliability is evidenced by the fact that the entire Porto Rican Government business, which is now transmitted over the new land lines from Havana to Santiago, was conducted during the month of June, 1900, without a single interruption.

In the Island of Porto Rico every important commercial or military point is in telegraph connection by a system of lines, which have also been entirely reconstructed and the routes improved since the disastrous hurricane of August, 1899.

PHILIPPINE MILITARY TELEGRAPH SYSTEM.

It has been assumed as a principle from the outset that the quickest means of pacifying and civilizing the Philippine Archipelago is to cover it with a network of telegraph wires. Commanding officers can crush an incipient uprising suddenly and before it has time to assume dangerous proportions by concentrating by telegraph the garrisons from all directions upon the one point involved. Already there are about 2,500 miles of land telegraph lines in operation in the Philippines, and about two hundred and sixty miles of inter-island and lake cables have been laid, every mile constructed by the United States Signal Corps since the battle of Manila Bay. At the last report the telegraphic messages in the Island of Luzon alone exceeded 6,500 per day, averaging over forty words each, or approximately 260,000 words daily.

It may be added that the telegraph is practically the only mail service that exists.

In Luzon two trunk lines have been established—one along the west coast, the other along the Rio Grande de Cagayan. The islands of Cebu and Leyte have been connected by cable, and a complete new route from Manila to Iloilo is in operation, furnishing a duplicate route to the present English cable direct from Manila to Iloilo. In the Department of Mindanao and Jolo, the plan involves direct communication, by cable, between the principal islands, and by land lines and cable to the telegraph system in the Department of the Visayas, and from thence, by duplicate routes to Manila.

THE ALASKAN TELEGRAPH SYSTEM.

The growing commercial importance of Alaska, and the prospective future of that country, have made the construction of a telegraph system for this territory an imperative necessity. Congress at its last session authorized an expenditure of $450,000 for the construction of such a line.

Owing to the shortness of the working season in this latitude, and the very unusual conditions under which the line must be constructed, as well as the lack of any adequate transportation, it was not hoped to complete the work this season.

The military cables connecting the gold district of Cape Nome with the Headquarters at St. Michael, and also connecting St. Michael with Unalaklik, which is to be the terminus of the land line up the Yukon, have been completed and have placed the Department Commander at St. Michael in direct communication with Cape Nome.

These submarine cables, involving in the aggregate nearly two hundred miles, were constructed by an American manufacturer, and were laid, equipped, and operated by American engineers.

The military forts to be connected, with the approximate distances, are shown in the following table:

	Valdez.	Fort Egbert.	Circle City.	Fort Yukon.	Rampart.	Fort Gibbon.	St. Michael.
Fort Egbert ..	350						
Circle City. ..	520	170					
Fort Yukon...	610	260	90				
Rampart	870	520	350	260			
Fort Gibbon..	940	590	420	330	70		
St. Michael...	1,490	1,140	970	880	620	550	
Cape Nome ..	1,610	1,260	1,090	1,000	740	670	120

By a recent temporary arrangement with the Canadian authorities this telegraph system will be enabled to reach the United States over the line now being constructed by the Canadian Government between Atlin and Quesnelle—a distance of about nine hundred miles.

A PACIFIC CABLE.

In order to bind together the local land telegraph systems which have been outlined above, these systems should be directly connected at an early date with the United States. First in this colonial system, comes the proposed trans-Pacific Cable, connecting California with the Hawaiian Islands, thence to Midway

Island, thence to the Island of Guam, and from there to the Island of Luzon.

A cable system from Vancouver via the Aleutian Islands to Japan and the Philippines has long been proposed, and has many points, commercial and technical, in its favor as a trans-Pacific route. The true solution is thought to be the early construction of both of these trans-Pacific cable lines, thereby furnishing, first, a direct connection to the Alaskan system, and by a later extension to the Philippines a duplicate route for the protection of the more southern line via Hawaii. A short cable from Sitka to Valdez would be one means of perfecting a junction with the Alaska land system.

The recent acquisition by the United States of the island of Tutuila, and the construction in Pago Pago Harbor of a coaling station, makes it desirable to join this advanced American station in the southwestern Pacific to the Hawaiian Islands by submarine cable.

This can probably be most readily accomplished by connecting it directly to Fiji, a station on the British-Pacific cable route.

To further complete this proposed colonial telegraph system, it will be necessary to connect the island of Porto Rico by submarine cable to the United States, and, although of greater length, a line direct from New York to Porto Rico is suggested as offering many advantages. The shortest line is not always the most advantageous. For instance, Haiti is connected direct to New York City, instead of to the coast of Florida, which would be much nearer, and Bermuda is connected direct with Halifax, for the sole object of exclusive British control under all circumstances.

ESTIMATED COST OF PROPOSED COLONIAL TELEGRAPH SYSTEM.

CABLES IN THE PACIFIC.

Trans-Pacific cable, San Francisco via Hawaiian Islands, Midway Island, and Island of Guam to Luzon	$12,000,000
Inter-island communication for the Hawaiian group	$150,000
To complete the Inter-island telegraph system of the Philippines	250,000
For Alaska telegraph system, as already authorized by Congress	450,000
To extend the Alaska telegraph system and to connect it to the United States by direct cables, and also for further extension to the Philippines via the Aleutian Islands, providing a duplicate trans-Pacific route to the Philippines	10,000,000
For cable connections with Tutuila Island coaling station at Pago Pago Harbor	650,000

CABLES IN THE ATLANTIC.

Direct cable from the coast of the United States to the island of Porto Rico	1,500,000
Total	$25,000,000
Estimated cost of proposed Isthmian Canal	$200,000,000
Relative cost of two enterprises	1 to 8

This estimate, which is necessarily a very general one, due to the great fluctuations in the price of materials, the inexperience of American manufacturers, etc., shows that with an expenditure of $25,000,000, or perhaps $30,000,000 at most, the United States can have a telegraph system connecting all her possessions, and placing each part of such possessions in direct connection with the United States by the best and most efficient means of communication known.

For the expense of three or four first-class battleships, the United States can provide herself with the most powerful means known for extending and preserving her commercial influence and for the speedy pacification and civilization of the people who have recently come under her control, and can secure a strategic advantage—military, naval, and political—which is necessary to her position as a world power.

Submarine cables are now established for colonial, political, and diplomatic reasons, as really as for their purely commercial purposes. Nor is actual state of war of the country itself the only fear; witness the present plight of France due

to the Transvaal War; owing to the fact that the cables to South Africa are under the control of England, and the establishment by her of a war censorship, France is absolutely dependent upon England not only for news from the Transvaal, but also for communication with her own colony of Madagascar, and her South Africa possessions. The importance of this subject has led her Colonial Commission to recommend recently the immediate construction of submarine cables, joining France with Senegal, Madagascar, and Tonkin, the latter connecting with the Danish company's cables. Indeed, the plan ultimately involves an estimated expenditure of $25,000,000 and includes a complete colonial cable system.

THE MILITARY CONTROL OF SUBMARINE CABLES IN TIME OF WAR.

The International Convention for the Protection of Submarine Cables, which met at Paris in 1884, made no provision defining the rights and immunities of cable property in time of war.

In addition to incorporating an article in the convention stipulating that this convention shall in no wise affect the liberty of belligerents, Lord Lyons, the British delegate, submitted the following declaration at the moment of signing the convention: "Her Majesty's Government understands Article XV in this sense, that in time of war, a belligerent, a signatory of the convention, shall be free to act in regard to submarine cables, as if the convention did not exist."

M. Leopold Orben, in the name of the Belgian Government, also submitted the following declaration:

"The Belgian Government, through its delegates to the conference, has maintained that the convention has no effect upon the rights of belligerent powers. Those rights would be neither more or less extensive after the signature than they are now. The mention inserted in Article XV, although absolutely useless in the opinion of the Belgian Government, would not, however, justify a refusal on its part to unite in a work the expediency of which is indisputable."

Before the Spanish-American War there were few examples of damages done to submarine cables by belligerents.

As has been pointed out, Article XV of the Convention of Paris, of 1884, for the Protection of Submarine Cables, subscribed to by twenty-six nations, specifically states that "The stipulations of this convention shall in no wise affect the liberty of belligerents." In consequence, the question as to what, if any, special protection was to be accorded submarine cables in time of war, remained theoretical until the Spanish-American War of 1898, when a practical rule of action was outlined by General A. W. Greely, Chief Signal Officer of the United States Army.

Upon the declaration of war, General Greely, upon whom by law devolved the operation of military telegraph lines and cables, was called into the national council for his opinion as to the line of action best calculated to subserve the legitimate rights of commerce and industry, while conserving the military interests of the United States. He took the view that, inasmuch as postal communications were forbidden between belligerents, prohibitive orders should be issued against such telegraphic correspondence as might benefit the public enemy, pointing out that telegrams, by their secrecy and rapidity, produce military results much more important and injurious than are possible by the use of the mail.

General Greely advised that cable operations should continue over the international cables between Havana and Florida, of course under strict military censorship, and his firm stand prevented any interruptions of this cable system. By his orders Captain R. E. Thompson, Signal Corps, United States Army, took military possession of the Key West telegraph office on April 23, 1898, and cut the cables so that Jacksonville could no longer work with Havana. Domestic and

business messages in open text were allowed to be sent and received from Havana, but only under strict military censorship. Similar action was taken at Havana by the Governor-General of Cuba, who established a rigid Spanish military censorship, so that all messages were subject to double scrutiny.

By his instructions General Greely recognized the existence of five classes of cables:

First: Those of which the termini are in the enemy's country; for instance, the Cuba Submarine Cable system along the south coast of Cuba.

Second: Cables which directly connect countries at war, so that each belligerent controls one end of cable; for instance, that of the International Oceanic Telegraph Company between Florida and Havana.

Third: Where one end of the cable is in the enemy's country and the other in neutral territory; for instance, the West India and Panama cables extending through Cuba to Porto Rico, and thence to Saint Thomas.

Fourth: Where a cable extends from the coast of an offensive belligerent to a neutral country contiguous to the territory of the defensive belligerent; for instance, the Haiti Cable from New York City to Haiti, where there is direct cable connection with the Island of Cuba.

Fifth: Cables having one terminus in the territory of the offensive belligerent and the other in neutral regions remote from the scene of hostility; for instance, the Atlantic cables connecting the United States with Europe.

To cables of the first class, whether the property of the defending enemy or a neutral corporation, was applied the simple and well-known rule that they are subject to the vicissitudes of war, and that being in use for war purposes they are proper objects of offensive military operations. The orders issued to the officers of the Signal Corps looked upon these cables, whether they were laid in the high sea or along the immediate coast, as liable to seizure and total destruction.

Cables of the second class were easily dealt with. The cables between Key West and Havana were taken possession of, militarily, by Spain in Cuba and by the American Army in Key West. Messages going and coming were subjected to the most rigid military censorship at both ends of the cable. Only messages in plain text bearing upon business and social subjects were permitted, and where any suspicion existed as to the loyalty of the sender were either refused or not sent. Exceptional cipher messages were permitted as a matter of courtesy and favor to selected diplomatic representatives of neutral nations.

The cables of the third class were viewed as contraband of war; but it was also recognized that their liability to destruction depended in a measure on the locality of the cable. General Greely recognized as unsettled and of doubtful expediency the right of any belligerent to raise from the bottom and destroy on the high sea a neutral cable, merely on the ground that such cable landed in a hostile country. He, however, applied a more rigid rule to such portions of cables, cable huts, instruments, etc., as were located within the territorial jurisdiction of the enemy. This rule was based on the principle that such cable property, whether belonging to an enemy or to neutral corporations, is not only subject to the vicissitudes of war, but, being contraband of war, is a legitimate object of military operations. In accordance with this view his orders to Colonel James Allen, Signal Corps, charged him to use his utmost efforts to cut off the south coast of Cuba any cable that could be grappled and picked up, either within a marine league of the coast, or within range of Spanish batteries.

In Cuba and Porto Rico, during the Spanish-American War, certain neutral cable stations of this class fell within the

power of the Army of the United States. In such cases the officials of the neutral cable companies were given a choice of action. They could abandon their property to the vicissitudes of war, or accepting the *force majeure,* were allowed to transact business under strict military censorship. Even during the siege of Santiago the orders permitted the French Telegraphic Cable Company to accept business for Santiago de Cuba within the Spanish lines, every such message, however, to be viséd by the military censor.

The fourth class of cables were seized by the military forces of the United States and operated under strict military censorship. Code and cipher messages were absolutely refused save for the authorized government agents and certain excepted diplomatic representatives, the latter as a matter of courtesy.

Cables of the fifth class were placed under a military censorship. Of these, there were six systems comprising separate cables. Most of these telegraph cables were only constructively seized, General Greely taking the responsibility of intrusting the direct censorship of messages, under the general supervision of an officer of the Signal Corps, to the respective superintendents, men of high character, whose good faith was guaranteed by the companies whose interests they likewise guarded. The interests of the United States were thus subserved while the privacy of the affairs of the companies was conserved. The responsible officials gave a written pledge to observe such rules as might be filed by the Chief Signal Officer with the companies. These rules prohibited all messages to and from Spain, and also certain other classes which were deemed prejudicial to the military interests of the United States. In cases of doubt, messages of the latter character were examined and viséd by the military censor.

The events of the Spanish-American War brought to attention the whole subject of the legal rights of cable property and the control of the same under varying and complex conditions in time of war. In the absence of definite international law upon the many points involved, the United States was forced to take the initiative and use this powerful military weapon for the benefit of the cause of the United States, while at the same time respecting and subserving the rights of neutrals with an equity and fairness which has always characterized the actions of this Government when possible.

In the West Indian cables, as well as in the cable connecting the Philippines with Asia, the cable question was always a paramount one, and the United States finds herself now confronted with legal questions, growing out of actions necessary in time of war. Since submarine cables have become such a dominant influence in time of war, and since the cases which may naturally arise are often complex and involved, it is clear that a further international cable conference is a necessity of the near future, by which a more definite international understanding of methods of procedure in time of war may be attained. This international conference could properly consider other international cable matters, which the great advance in submarine telegraphy has made important. Among these may be mentioned the construction and authorization of a uniform international cable code, for the economical and efficient communication between different parts of the world in any of the principal languages now authorized by the international telegraph rules.

THE CABLE EQUIPMENT OF A FLEET.

It seems clear from the history of the Spanish-American War that provisions must be made for laying, picking up, cutting, and operating submarine cables in time of war. From the outbreak of this war every attention was given to the problem of isolating the island of Cuba from Spain.

The special fitting out of the *Adria* with cable appliances, as well as spare cable, the work of the *St. Louis* in cutting cables, the operations of the *Marblehead, Nashville,* and *Windom* at Cienfuegos, and of the *Mangrove,* are too well known to be repeated here. It will be more valuable to endeavor to draw the correct conclusion from these operations, and thereby make proper provision for the execution of similar operations in time of war.

It appears that the searching for deep-sea cables in the high seas in time of war, without an accurate chart of the location of the cable, is a difficult and very doubtful operation; also that submarine cables must in general be interrupted near their landing places, where their exact location can be determined with certainty. From the experience of the Spanish-American War, operations of this kind are extremely dangerous, as the cable landing will be protected and defended by the enemy.

Supply of spare cable and suitable instruments for working the same must be available with every naval fleet—in order to supply the necessary communications with the shore, in case of the landing of either a coöperating army, or of temporary forces from the ships. Cable-ships engaged in either laying, cutting, or repairing cable near the shore, must either be provided with their own means of defence, or else convoyed by war-ships.

These facts make it clear that a new type of naval ship is to make its appearance as a necessary adjunct to every naval fleet. Just as the naval repair-ship, such as the *Vulcan,* has been found useful and necessary, so will the new cable cruiser be an essential part of the navy of the near future. It is not intended here to enter into the question of the proper design of such ships, but it would seem that a specially designed cable-ship, with comparatively large coal capacity and high speed, and an armament of the lighter cruiser class, making her capable of defending herself and protecting her small-boat parties, would be best adapted for the purpose. She must carry a moderate supply of spare cable and machinery for laying and picking up cable, as well as instruments for testing and operating a cable, and the necessary buoys, suitable, if necessary, for buoying the cable, and operating the ship as a floating cable station. It is unnecessary to state, also, that her personnel must be specially trained in the highly technical duties required, and from actual practice in all the operations necessary, be made ready for the performance of their duties efficiently under the conditions of war.

Although these naval cable cruisers in time of peace could be profitably employed in maintaining and repairing both cables belonging exclusively to the government, and those subsidized by the government, under suitable arrangements, yet, at the outbreak of war they should be absolutely and exclusively under the control of the government. It may be said at present that no modern fleet is complete without a cable-ship, especially adapted for cable operations in time of war.

Since submarine cables are so important a factor in national defence, they should be protected both at their shore landings and on the high seas by military and naval force.

In this connection it would seem advisable in case of government cables, or of cables subsidized by the government, to keep the exact route of important cables a secret, and prevent the publication of maps for general distribution, showing their exact location in the deep sea. The location of the shore ends, however, is certain to be known.

A cable landing, for the future, should partake of the character of a fort, and be provided with adequate means for preventing an enemy from locating and destroying the cable within the marine league, or, until it has reached deep sea, where its accurate location is not known.

The sea is usually considered as the great international highway, belonging equally to all nations; this, however, is no longer true. The real political boundaries of states are no longer defined and restricted by the land, but involve such portions of the high seas as a nation can, by her commercial and naval vessels, and her submarine cables, reach out and secure. In this great sea division, which is so surely taking place, probably there are no better guides to boundaries than the submarine cable net-works which lie in its great depths. Since each in general uses the shortest path between two points, the general commercial sailing lines are also the general direction of cable lines.

The United States will be wise if, in the great Pacific where she has such paramount natural advantages, both for commerce and for maritime strength, she pursues a broad, vigorous, and even lavish "cable policy." We should be able at the earliest date to manufacture upon American soil deep-sea cables of the first class; be able to lay, maintain, and repair them in time of peace or war by ships flying the American flag, and be prepared to adequately protect them upon the high seas, and at their landing places by military and naval force.

The cable question is one of the most important of the present hour, unique in that American commerce, diplomacy, and sea-power—in fact the most efficient means of advancing and securing the benefits of civilization itself—happily conspire in demanding its early solution.

THE INDIAN TRIBES OF SOUTHERN PATAGONIA, TIERRA DEL FUEGO, AND THE ADJOINING ISLANDS

By J. B. HATCHER

Carnegie Museum, Pittsburg

IT is the purpose of this paper to record some observations made by the writer among the Indian tribes of Southern South America, during the three years of exploration conducted by him in that region in behalf of Princeton University. The country occupied by the people under discussion embraces that part of South America lying beyond the forty-sixth parallel of south latitude, including the mainland and the adjoining islands as far south as Cape Horn. The people living in this region belong to four distinct tribes, each inhabiting a certain limited area and differing from the others in language, customs, physical development, and especially in the activities necessary to, and the mechanical appliances employed in, the gaining of a livelihood.

Owing to the natural barriers to social or commercial intercourse, presented by the topography of the region, communication between the different tribes is now and always has been extremely limited. This long period of comparative isolation has, with one exception, permitted each tribe to remain practically uninfluenced by the others, and has doubtless contributed to produce those linguistic and sociologic features at present so distinctive of each.

Commencing with the mainland we shall first consider the Tehuelches, that so-called race of giants, made famous

by the exaggerated accounts of them brought home by the earliest travellers from Magellan's time to the beginning of the present century. Of splendid physique, they are abundantly able to withstand the rigorous climate of the bleak, treeless plains of Eastern Patagonia, where they live and find ample sustenance and wholesome employment in the pursuit and capture of the guanaco and rhea; both of which are extremely abundant throughout the entire extent of this region.

As a people, though not the race of giants they were commonly reported to be by most early writers, the Tehuelches are, nevertheless, decidedly above the average size. Of the three hundred Tehuelches living between the Santa Cruz River and the Strait of Magellan, I should place the average height of the men at not less than five feet eleven inches, with an average weight of one hundred and seventy-five pounds. While the fully grown women (those above twenty-four years of age) I should estimate at five feet seven inches, and of an average weight of but little, if any, short of that of the men. This lack of disparity between the physical development of the sexes is paralleled also in their mental development. It is noteworthy, and is due very largely to the division of labor among them. The labor necessary for the support of the family is more equally divided between husband and wife, among the Tehuelches, than is common with the Indian tribes of North America.

That these Indians are muscular and well proportioned, is seen by a glance at the illustrations accompanying this paper. There is a tendency to obesity rather than angularity. Conscious of their physical strength, like most persons of great physique even among the more civilized nations, they exhibit a kindly manner and gentle disposition. Accustomed to the free life of the plains, and living in the midst of an abundance of those animals that for centuries have supplied all their simple wants, they display that homely hospitality so characteristic of well-fed and well-clothed savage and semi-civilized people in sparsely settled countries. The frank, open countenance of the Tehuelche at once allays any uneasiness and establishes a feeling of confidence in the mind of the solitary traveller who, in the course of his lonely wanderings throughout Patagonia may, by chance or necessity, be thrown among them.

The Tehuelches were formerly a considerably more numerous people than at present, though it is hardly possible that they at any time numbered more than 5,000. It is doubtful if there are more than five hundred of them remaining in all Patagonia, and this small number is being rapidly reduced by diseases introduced among them through contact with the whites. That they are not a prolific people is strikingly evidenced by the small number of children common to pure-bred Tehuelche families. In cases where both parents were of pure Tehuelche stock, I do not remember to have seen more than three children in any one family, while one or two were much more generally the number, and frequently there were families with no children. On the other hand in those families where a Tehuelche woman was married to a husband of Spanish, French, or Portuguese descent, such unions were, as a rule, ordinarily productive of offspring, there being frequently six or seven children to the family.

Firearms are quite unknown among the southern Tehuelches. They rely entirely upon their skill with the bolas, aided by their horses and dogs, for the capture of the guanaco and rhea, from which they derive not only their chief sustenance, but also the skins employed in the construction of their clothing, bedding, and tents or toldos. Formerly they used the bow and arrow, but with the introduction of the horse at the advent of the Spaniard, the bola entirely supplanted the bow and

arrow, and at present the latter weapon is no longer seen among them.

The changes wrought upon the Tehuelches by the advent of the horse, is a subject well worthy of the attention of the anthropologist. To this professional capacity I lay no claim, but I wish to mention some observations made by myself bearing directly upon this subject. Not only was the advent of the horse the determining factor in supplanting the bow and arrow by the bola among these Indians, but the introduction of that useful animal produced other most decided changes in the life and habits of the Tehuelches. Prior to the introduction of the horse they were dependent upon the bow and arrow not only for securing their food and clothing, but also for protecting themselves from the more numerous and warlike Indians who inhabited the country to the north, and with whom they were constantly at war. Greatly outnumbered by a deadly enemy and deprived of any rapid means of escape if attacked by a superior force, their favorite camping places were then chosen with reference to concealment and defence, quite as much as, or even more than, for their convenience to natural food supplies. In those pre-equine days, if I may use the term, the Tehuelche was wont to select for his encampment a secluded place in the bottom of some deep basalt cañon, adjacent to a stream or small spring, or if living on one of the larger rivers, the encampment would be situated not in a conspicuous place in the bottom of the valley, convenient to an abundance of grass and water, as at present, but would be hidden away in some bend of the stream or placed high up among the débris of basaltic rocks that encumber the slopes of most of the more important streams of the Patagonian plains. In such positions their low, box-like toldos, made of guanaco skins of a dull brown color, would not be easily detected.

Many such old camping places may now be seen, strewn with pieces of broken pottery, worn out and discarded stone scrapers, stone chippings, arrow points, drills, mortars, etc. A site of one of these old-time Indian villages I examined very carefully. The bottom of the cañon bears unmistakable evidence of having been long used as a favorite camping ground of the Tehuelches. The soil over a considerable area is literally filled and covered with stone chippings, scrapers, broken pottery, broken and charred fragments of bones of mammals, birds and fishes, the latter taken from the stream which still flows between the village site and the high bluff beyond.

At this place I picked up about two hundred arrow points and drills, most of them imperfect, but did not find a single bola. Is it not possible that the introduction of the horse brought about the abolition of the bow and arrow and the adoption of the bola as a weapon of offence and defence? The bola, considering the limit of its effective range, and the time necessarily consumed in attaining a sufficient impetus before discharging it, certainly does not appear to be especially well adapted for the capture, by a man on foot, of animals possessed of such speed and endurance as are the guanaca and rhea. Whether the bola was in use among these Indians prior to the advent of the horse, can perhaps never be definitely determined, but there can be little doubt that as an implement for the capture of game, it came into far more general use after the introduction of the horse, when it began gradually to displace the bow and arrow, finally resulting in the total disappearance of the latter weapon. Throughout my travels in Patagonia I was struck by the almost total absence of bola stones about the old village sites, where arrow points were as a rule found in unusual abundance. The place just referred to was evidently long occupied as a favorite encampment. That it has been long abandoned is evident from the fact that over considerable areas implement-bearing strata are buried beneath several feet

of æolian drift materials. Moreover, the locality is one absolutely unfitted as a camping place for the present Indians, accompanied as each band invariably is by several hundred horses, thus necessitating the selection of a site near abundant grazing lands.

The coming of the Spaniard among the Tehuelches has resulted in the disappearance of still other implements than the bow and arrow. Scattered about the old village sites are numerous pieces of broken pottery, though the manufacture of pottery is now a lost art with the

Channel Indians of the West Coast and Western Part of Strait of Magellan.

Tehuelches. Upon examination of many of the more perfect of these earthen vessels, it was found that they were punctured with a series of small holes in the bottom, and that the surface of the interior, over the bottom and a considerable portion of the sides also, was blackened and charred, thus bearing unmistakable evidence of having been subjected to the continued action of fire. It occurred to me that such earthen vessels were used for conveying fire from one encampment to another when on the march. Upon inquiry I was pleased to hear this theory confirmed by an aged Tehuelche woman who remembered distinctly that in her childhood fire was frequently transported with them when on the march.

The Tehuelches find their chief employment in hunting the guanaco and rhea or South American ostrich. The region inhabited by them extends northward from the Strait of Magellan along the western border of that part of the country occupied by the prosperous Patagonian sheep farmers, and which lies adjacent to the Atlantic coast. This sheep-farming district extends westward from the coast for an average distance of about thirty miles. Between this thirty-mile strip and the Andes is the home of the Tehuelche. Of the habitable portions of the earth's surface, it is perhaps the most sparsely settled of all. Notwithstanding its natural resources, over thousands of square miles are entirely uninhabited. For the most part, it is indeed comparatively barren, as in the lava beds of the central interior region, but to the westward over the lower slopes of the Andes and in the valleys entering the mountains, there are exceedingly fertile regions, capable of supporting considerable populations, but at present quite unoccupied by either Indians or Europeans. The writer, together with Mr. O. A. Peterson, spent five months of travel during the summer of 1896–97 in the country lying between the sources of the Santa Cruz and Desire Rivers without encountering either whites or natives.

The Tehuelche is and always has been a plainsman. His methods and the implements employed by him in the chase are designed for a level open country, and are not adapted to rough, mountainous, or wooded districts. Greatly reduced in numbers he finds the area still left to him in his natural habitat more than ample to supply his simple wants and satisfy his inherent, nomadic disposition. Left to himself, his necessities are few and easily supplied, for nature in Patagonia is exceedingly lavish in furnishing those animals that provide him with every domestic necessity. Give to the Tehuelche his horse, dogs, and bolas, and destroy all other animal life indigenous to the region save only the guanaco, and he would continue to exist, experiencing little inconvenience.

The guanaco is to his existence the one important and indispensable animal. From its flesh he derives his chief and for long periods only sustenance, while from its skin his industrious wife constructs the family toldo and makes with admirable skill and patience their ample clothing and bedding, fitting and sewing the parts with the nicety and proficiency of a skilled seamstress. A wooden or bone awl used as a delicate punch is her needle, and the sinew taken from the loin of the same animal her thread. From this same beast he likewise obtains the sinew for the light but exceedingly strong thongs of his bolas.

But the guanacos are in no danger of extinction. They roam in thousands over the Patagonian plains. So abundant are they that in travelling across the country it is scarcely possible to pass out of sight of them. Contrary to the general rule with undomesticated animals, the guanacos inhabiting settled regions are far less timid than those of unsettled districts. In that region along the coast occupied by the sheep farmers, they exist in great numbers, are exceedingly tame, and are a source of considerable annoyance to the herdsmen, who nevertheless suffer them to go unmolested.

Tehuelche Tent.

Beyond the settlements the guanacos are more difficult of approach, and in the Cordillera they are exceedingly wary, as is also the rhea or so-called ostrich. This is the more striking and difficult of explanation since the deer in the same mountainous region seem absolutely fearless and prompted by curiosity rather than fear when approached. On several occasions, when in need of meat while travelling through the Southern Andes, we located a band of deer and walked directly up to within twenty or thirty feet of them before shooting. Neither the report of the rifle nor the death-struggles of their companion aroused in them any apparent feeling of uneasiness. The surviving members of the band stood about at a distance of only a few feet, taking notes as it were, while we were engaged in skinning and dressing the carcass of their fallen comrade, often approaching so near that we would be compelled to suspend operations and urge the spectators to remove to a more respectful distance.

THE ONAS OF THE FUEGIAN PLAINS.

Closely resembling the Tehuelches and evidently derived from the same original stock, are the Onas, inhabiting the plains and timbered regions of central, northern, and eastern Tierra del Fuego. Like the Tehuelches they are of splendid physique and live entirely by the chase. They are essentially a plains people and only occasionally frequent the coast. Their island having been separated from the mainland for a remote period of time, they have been practically cut off from all communication with their relatives on the northern shores of the eastern stretches of the Strait, and have thus developed a language quite distinct from that of the Tehuelches, while many of their customs and arts differ materially from those of the latter. Not being a maritime people, they have been unable to import the horse from the mainland, so that the Onas of today are in much the same condition as were the Tehuelches of the mainland prior to the introduction of the horse. With the Onas the bow and arrow is still the one indispensable weapon for offence and defence, while bolas and horses are quite unknown among them.

Owing to the extremely advantageous nature of their lands for sheep-farming purposes and the consequent aggressiveness of the Fuegian sheep-grower of the present day, the tribe is being rapidly decimated, and their extinction in the no distant future seems inevitable. Already their natural habitat is entirely occupied by Europeans, and they have been driven back into less favorable districts where food is scarce and obtained with difficulty. Naturally a state of constant warfare exists which will inevitably lead to the extermination of the Onas.

THE CHANNEL INDIANS.

Between the eastern and western coasts of Patagonia and Tierra del Fuego there are extreme climatic and physiographic differences. The treeless, semi-arid, and level plains of the east coast, with but few indentations, are replaced on the west by an intricate series of islands, peninsulas, capes, and promontories, separated by a labyrinth of inlets, bays, sounds, and channels, surrounded by one of the most picturesque and rugged mountain systems to be seen anywhere on the earth's surface. These mountains serve as a barrier to the southwesterly winds that prevail here, and effectually deprive them, during the passage over their summits, of most of the moisture with which they have become charged on their long journey across the Southern Pacific. Thus precipitation is constantly taking place, and the surface is perpetually drenched with moisture, thereby producing a vegetable growth, which at low altitudes, even in the latitude of the south and west coasts of Tierra del Fuego, rivals in profusion and luxuriance that of the Tropics. It contrasts strikingly with the eastern plains and river valleys, which are destitute of trees or forests

A Tehuelche Brave—Twenty-five Years of Age.

and where the annual precipitation is just sufficient to support a few species of short but succulent grasses, with occasional clumps of low, scrubby, and usually thorny bushes, characteristic features of semi-arid regions.

The natives of the Pacific coast differ from those of the Atlantic quite as much as do the climate, vegetation, and physiographic features. The natives of the west coast, while belonging to at least two distinct tribes, may be very appropriately denominated, collectively, as Channel Indians. All their activities cluster about the coast. They live on and about the shores of the inland waters of the Fuegian Archipelago and the west coast of Patagonia, never venturing inland for more than a few miles. They are essentially a maritime people, deriving their chief and almost only sustenance from the sea. They are small in stature and inferior in physique to the Tehuelches and Onas of the Patagonian and Fuegian plains, and their origin has undoubtedly been quite distinct from that of the latter tribes.

For houses they usually erect exceedingly primitive structures formed of interwoven or piled-up branches of trees, which would seem, even to most semi-civilized peoples, quite inefficient protection from the storms that almost constantly prevail here. They find their chief occupation in collecting shell-fish, in fishing, and in hunting the fur-seal and sea-otters. From the skins they make their scanty clothing, while the flesh and blubber serve them as additional food.

The chief food of the Channel Indians is the shell-fish that live in great abundance in the waters of this coast. When the supply of shell-fish of any particular cove which may have been selected as a camping-place by a party of these Indians becomes reduced, they place their few domestic necessaries in their canoes and proceed by water to a new encampment where food is abundant. In this manner they move about from place to place in order to procure sufficient food. They eat their food either raw or slightly roasted on fires that are kept constantly burning on a few sods placed in the bottoms of their canoes. They are not entirely carnivorous, frequently varying their diet by the addition of a few species of edible fungi that grow on the beech-trees of the adjacent forests.

Their canoes are fashioned of large slabs of bark supported by numerous ribs of wood and sewed together with thin strips of whalebone. Sometimes they use, instead of bark, thin slabs of wood hewn out with great patience. One or two instances of true dugouts have been reported among the Yahgans inhabiting the eastern portion of the south coast of Tierra del Fuego and the islands about Cape Horn. Their harpoons and spears are almost always of bone.

The Channel Indians are of two distinct tribes, differing in language, though for the most part quite similar in their mode of life and in the arts employed by them in the gaining of a livelihood. The more numerous and more warlike and powerful of these tribes are known as the Alaculoffs. They occupy all the west coast of the mainland together with the adjacent islands, the western stretches of the Strait of Magellan, southern and western Tierra del Fuego as far east as Beagle Channel, and the islands lying to the southwest. The remaining south coast of Tierra del Fuego and the adjoining islands as far south as Cape Horn are the home of the Yahgans, formerly the most powerful of all the Indian tribes of this region, but now nearly exterminated by the combined attacks of the Onas and Alaculoffs, aided by diseases, chiefly pulmonary, introduced among them through the mistaken kindnesses of over-zealous missionaries, themselves exceedingly deficient in the first principles of hygiene.

The Yahgans are doubtless only a remnant of a once powerful people that inhabited the region now occupied by the Alaculoffs. They have been crowded into

Tehuelche Squaw.

narrower and narrower limits until finally reduced to their present territory. That they have long dwelt in their present habitat is evidenced by the numerous shell-heaps that have been accumulated about the more favorable camping places along the bays and inlets of this coast. These shell-heaps or kitchen-middens have been observed attaining to a height of twelve or fifteen feet and to more than one hundred feet in length. The time consumed in the accumulation of such quantities of shells indicates for them a considerable antiquity.

LOCATION OF THE BOUNDARY BETWEEN NICARAGUA AND COSTA RICA

By Arthur P. Davis, Chief Hydrographer, Isthmian Canal Commission

THE promise which the construction of a water-way gives of increased development and commercial importance to the Central American republics, has been a source of considerable jealousy between Nicaragua and Costa Rica, and until recently there was continual dispute over the boundary line between these republics, each being anxious to preserve and increase its territorial interests in proximity to the proposed canal route. Both states had been wrought up by years of fruitless negotiations to a state of readiness for war in defence of what they considered their rights. In fact, war had actually been declared by Nicaragua on November 25, 1857, when, through the mediation of the Republic of Salvador, a final effort to avert it was made. Another convention was held and a definite treaty was concluded between the two republics in April, 1858, Article 2 of which runs as follows:

"The dividing line of the two republics, starting from the northern sea, shall commence from the extremity of Castilla Point, at the mouth of the Rio San Juan of Nicaragua, and shall continue its course along the right margin of said river to a point 3 English miles distant from the Castillo Viejo, measured from the exterior fortifications of said castle to the point indicated. From there a curve will start, the centre of which shall be said works, and shall preserve a distance of 3 English miles from it throughout its development, terminating at a point which shall be 2 miles distant from the bank of the river, upstream from the castle. From there the line shall continue in the direction of the Sapoa River, which empties into Lake Nicaragua, following a course almost 2 miles distant from the right margin of the Rio San Juan, with its circumvolutions, to its origin at the lake, and of the right margin of the lake itself to the said Sapoa River, where this line, parallel to said margins, will terminate. From the point of intersection with the Sapoa River, which, from what has been said, should be 2 miles distant from the lake, a right astronomical line shall be drawn to the central point of Salinas Bay, in the southern sea, where the demarcation of the territory of the two republics shall terminate."

This boundary was for many years unsurveyed, and after the treaty of 1858 a change occurred in the regimen of the San Juan, by which the main portion of its waters, instead of flowing to the sea

at San Juan del Norte, as formerly, followed another course to the ocean, known as the Colorado River, while the lower San Juan, which was formerly the main stream, became a subordinate distributary. This led to a new dispute, Nicaragua claiming that the main stream, or Colorado River, was the true boundary, and calling in question in general the validity of the provisions of the treaty of 1858. This dispute was submitted to the arbitration of President Cleveland, who made an award on March 22, 1888, declaring the treaty to be valid, and the old or San Juan River to be the line. This decision was accepted by both republics, and at their request an umpire was appointed by President Cleveland to decide doubtful points during the survey of the boundary line. General E. P. Alexander, of North Carolina, was appointed to fill this position, and the boundary line has recently been surveyed.

During the progress of this survey several interesting points of difference arose between the representatives of Nicaragua and Costa Rica, which were decided by the arbitrator to the satisfaction of both parties. The first point, and a very important one, related to the point of beginning, called in the treaty "Punta de Castilla." The lower San Juan, after separating from the Colorado, flows toward Greytown for a considerable distance and then sends a small distributary to the ocean called the Tauro. The main river reaches the Caribbean near Greytown, through two mouths with an insular delta between them.

Nicaragua claimed that the mouth of the Tauro should be considered as the mouth of the San Juan, and that the point of beginning was at the right bank of the mouth of this distributary, but there seems to have been little basis for this claim.

Costa Rica claimed as the starting point the western extremity of the deltaic island, the base of this claim being that this was the right bank of the mouth of the main San Juan and that it had been called Punta de Castilla by three authorities cited, one of them being a prominent Nicaraguan politician, Mr. J. A. Gamez.

The arbitrator pointed out, however, that a large array of authority, including nearly all public maps, called this Punta Arenas, and that if such an important concession had been made by Nicaragua the representatives of Costa Rica would certainly have insisted upon mentioning the name "Punta Arenas" in the treaty, and similarly, if the Tauro had been intended, the representative of Nicaragua would certainly have insisted upon the insertion of that name; but neither of these names occur in the treaty. The point which was the extremity of the headland of Punta de Castilla in 1858 has now long been swept over by the Caribbean Sea, and so many changes have occurred in the shore outline that it is not now possible to locate the exact spot. The arbitrator therefore decided that "under these circumstances it best fulfils the demands of the treaty and of President Cleveland's award to adopt what is properly the Headland of to-day; or the northwestern extremity of what seems to be the solid land on the east side of Harbour Head Lagoon; and the initial line of the boundary to run as follows, to-wit:

"Its direction shall be due northeast and southwest, across the bank of sand, from the Caribbean Sea into the waters of Harbour Head Lagoon.

"It shall pass, at its nearest point, three hundred (300) feet on the northwest side from the small hut now standing in that vicinity.

"On reaching the waters of Harbour Head Lagoon the Boundary Line shall turn to the left, or south-eastward, and shall follow the water's edge around the Harbour, until it reaches the river proper by the first channel met.

"Up this channel, and up the river proper, the line shall continue to ascend as directed in the Treaty."

The next point of difference was that

with regard to the edge of the river, Nicaragua claiming that it should be the edge at high water and Costa Rica claiming the edge at low water. Both claims were overruled, that of Nicaragua including as a portion of the river large areas of land covered with vegetation submerged at extreme high water, and Costa Rica's including within her territory numerous islands which were connected to the land by sand-bars, exposed at extreme low water. As the river was referred to in the treaty always as a navigable stream, General Alexander decided the line to be that indicated by the surface of the water at the lowest navigable stage of the river, which is rather above the average height, the lower river being scarcely navigable at mean stages.

The survey followed this line on the right bank of the river to a point three English miles below the Castillo Viejo. Here the line left the river, the point being marked by a large concrete monument. From here, owing to the dense tropical jungle, the line was not actually run, but points upon the line were located on streams, and at other places which were accessible either by boat or by land, and every foot of the line from Castillo to the Pacific is located by a compromise of the engineers.

Another important point of difference was with regard to the definition of the expression "the right margin of Lake Nicaragua." The argument and award of General Alexander are as follows:

"Under the influence of rainy seasons of about seven months, and dry seasons of about five, the level of Lake Nicaragua is in constant fluctuation. We shall have to discuss five different stages.

"1st. Extreme high water; the level reached only in years of maximum rainfall, or some extraordinary conditions.

"2nd. Mean high water; the average high level of average years.

"3rd. Mean low water; the average low level of average years.

"4th. Extreme low water; the lowest level reached in years of minimum rainfall, or other extraordinary conditions.

"5th. Mean water; the average between mean high water and mean low water.

"The argument presented to me in behalf of Nicaragua claims that the level to be adopted in this case should be the first level named, to-wit: extreme high water. It argues that this line and this line alone is the true limit of what the argument calls the 'bed of the lake.' Costa Rica claims the adoption of the third level, to-wit: mean low water. This is argued principally upon two grounds: First, it is shown by a great number of legal decisions that, in most states, all water boundaries are invariably held to run at either extreme or mean low water. Second, it is claimed that, in case of any doubt, Costa Rica is entitled to its benefits, as she is conceding territory geographically hers.

"I will begin with Costa Rica's first argument. The equity of adopting a low water line in the case of all water boundaries is readily admitted, even though instances of contrary practice exist.

"Between all permanent lands and permanent waters usually runs a strip of land, sometimes dry and sometimes submerged. We may call it, for short, semi-submerged. Its value for ordinary purposes is much diminished by its liability to overflow, but, as an adjunct to the permanent land, it possesses, often, very great value. If the owner of the permanent land can fence across the semi-submerged he may save fencing his entire water front. He also can utilize whatever agricultural value may be in the semi-submerged land in dry seasons. Both of these values would be destroyed and wasted if the ownerships were conferred upon the owner of the water. Therefore equity always, and law generally, confers it upon the owner of the permanent land.

"I recognized and followed this principle in my award, No. 3, where I held that the boundary line following the right

bank of the San Juan River, below Castillo, follows the lowest water mark of a navigable stage of river. And, if now the lake shore were itself to be the boundary of Costa Rica, I would not hesitate to declare that the semi-submerged land went with the permanent land and carried her limits at least to the mean low-water line.

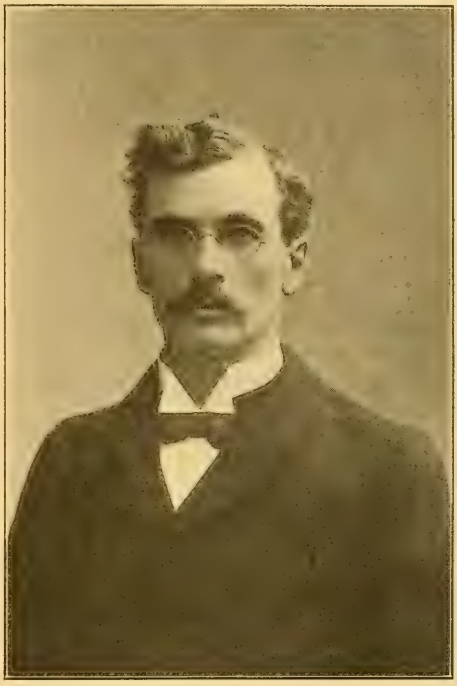
"But this case is not one of a water boundary; nor is it at all similar, or 'on all fours' with one, for none of the equities above set forth have any application. It is a case of rare and singular occurrence and without precedent, within my knowledge. A water line is in question, but not as a boundary. It is only to furnish starting points whence to measure off a certain strip of territory. Clearly the case stands alone, and must be governed strictly by the instrument under which it has arisen. That is the treaty of 1858; and its language is as follows:

"'Thence the line shall continue towards the river Sapoa, which discharges into the Lake of Nicaragua, following a course which is distant always two miles from the right bank of the river San Juan, with its sinuosities, up to its origin at the lake, and from the right bank of the lake itself, up to the said river Sapoa, where this line parallel to the said banks will terminate.'

"The principles upon which the language and intent of treaties are to be interpreted are well set forth in the Costa Rica argument by many quotations from eminent authors. All concur that words are to be taken as far as possible in their first and simplest meanings—'in their natural and obvious sense, according to the general use of the same words'—'in the natural and reasonable sense of the terms'—'in the usual sense, and, not in any extraordinary or unused occupation.'

"We must suppose that the language of the treaty above quoted suggested to its framers some very definite picture of the lake with its banks, and of the two-mile strip of territory. It, evidently, seemed to them all so simple and obvious that no further words were necessary. Let us first call up pictures of the lake, at different levels, and see which seems the most natural, obvious and reasonable.

"The very effort to call up a picture of the lake, at either extreme high water or extreme low water, seems to me immediately to rule both of these levels out of



A. P. Davis, Chief Hydrographer, Isthmian Canal Commission.

further consideration. Both seem unnatural conditions, and I must believe that, had either been intended, additional details would have been given.

"Next; is the mean low water mark the first, most obvious and natural picture called up by the expression, 'the bank of the lake?' It seems to me decidedly not. During about eleven months of the year this line is submerged, invisible and inaccessible. It seems rather a technical

line than a natural one. The idea of a bank is of water limited by dry land with some elements of permanency about it. Even during the brief period when the line is uncovered, the idea of it is suggestive far more of mud and aquatic growths than of dry land and forest growths.

"To my mind, the natural, simple and obvious idea of the bank of a lake, in this climate, is presented only by the line of mean high water. Here we would first find permanent dry ground every day of an average year. Here an observer, during every annual round of ordinary seasons, would see the water advance to his very feet and then recede, as if some power had drawn the line and said to the waters, 'hitherto shalt thou come but no further.' Here the struggle between forest growths and aquatic vegetation begins to change the landscape. Here lines of drift, the flotsam and jetsam of the waves naturally suggest the limits of the 'bed of the lake.' . . . . .

"Without doubt, then, I conclude that mean-high-water mark determines the shore of the lake; and it now remains to designate that level, and how it shall be found.

"Several surveys of the proposed Nicaraguan Canal route, beside that of Commander Lull above quoted, have been made within the last fifty years. Each found a certain mean high level of the lake, and it might seem a simple solution to take an average of them all. But, as each adopted its own bench-mark on the ocean, and ran its own line of levels to the lake, I have no means of bringing their figures to a common standard. It seems best, therefore, to adopt the figures of that one which is at once the latest and most thorough, which has enjoyed the benefit of all of the investigations of all of its predecessors, and whose bench-marks on the lake are known and can be referred to. That is the survey, still in progress, under the direction of the United States Canal Commission. Its results have not yet been made public, but, by the courtesy of Rear-Admiral J. G. Walker, President of the Commission, I am informed of them in a letter dated July 10, 1899, from which I quote:

"'In reply I am cabling you to-day, as follows: 'Alexander, Greytown, Six;' the six meaning, as per your letter, 106.0 as mean high level of lake. This elevation of 106.0 is, to the best of our knowledge (Mr. Davis, our hydrographer), the mean high water for a number of years. . . .'

"'The highest level of the lake in 1898 was 106.7, last of November. The elevation of our bench mark on inshore end of boiler at San Carlos is 109.37. . . .'

"'A complete copy of this letter will be handed you, and also blue-prints of the maps made by the Commission of the lower end of the lake, which may facilitate your work.'

"As this Commission is the highest existing authority, I adopt its finding, and announce my award as follows:

"The shore line of Lake Nicaragua, at the level of 106.0 feet, by the bench marks of the United States Nicaragua Canal Commission, shall be taken as the bank of said lake referred to in the treaty of 1858."

The location of the line around the southern margin of the lake was the most difficult part of the whole survey. The country here is a vast morass, densely covered with tropical vegetation, even the sluggish streams being mostly choked with aquatic plants. The high water line was defined as 106 feet, while the level of the lake at the time of the survey was about 102. It became necessary, therefore, to determine an elevation four feet higher, which was usually several miles from the water's edge.

By means of levelling, it was ascertained that the swamps had a mean slope toward the lakes of about one foot per mile, and this was made the basis of most of the agreements. A few points on streams were located, the area of Nicaragua's two-mile zone was calculated, and

the boundary was defined by long tangents, including the proper area.

On reaching the Sapoa River a monument was erected, and a broken line to Salinas Bay was run, the boundary of the bay itself was surveyed, and the island was located.

The last important point decided by General Alexander was perhaps the knottiest of all. It was the definition of the centre of Salinas Bay, and the decision was both just and ingenious. The remarks of the Arbiter are as follows:

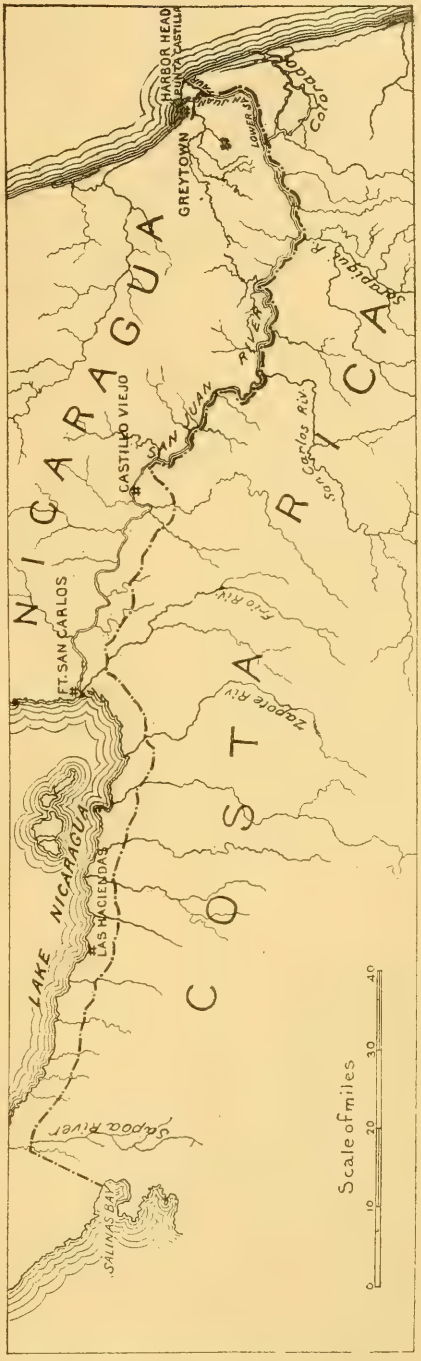
"The Bay of Salinas was carefully surveyed and mapped by officers of the United States Navy in 1885, and a map of the same is published in the United States Naval Hydrographic office, No. 1025. I have adopted this map, with the consent of both commissions, as correctly representing the outline of the Bay. In shape it is a curved pocket, starting east and bending southward, about five miles long, and about one-half of that in average width. Its outline a little resembles the rounded handle or butt of a pistol, with some irregular projections and indentations.

"It is desired to find the mathematical centre of this figure, closed by the straight line joining the headlands of the Bay.

"The mathematical centre of an irregular figure is the mid-position of its area. All mechanical centres, such as the centre of gravity or of equilibrium, etc., in which the action of any force is concerned, must be excluded from consideration.

"This will readily appear if we consider for a moment the case of a bay in the shape of a crescent. The centre of gravity of its figure would not fall upon the water of the bay at all, but upon the promontory of land embraced by the water. This, of course, could not be considered as the centre of the bay.

"Neither is any general mathematical process applicable, such as that of the method of Least Squares. This method will find the centres of any group of random spots, but were they disposed in cres-



Map Showing the Boundary Between Nicaragua and Costa Rica.

cent form, the centre would be, not among them, but within the convex space which they partially surround.

"Other methods must therefore be devised for finding the mid-position of irregular and restricted areas, and many might be suggested, more or less applicable to different figures. But it will be sufficient here to indicate only the method which I have adopted as best suited to the figure in hand, possessing, as this does, something of a curved or crescent shape.

"I have supposed a vessel to enter the Bay from the ocean, at a point midway between its headlands, and to sail a course as nearly as possible equidistant between the opposite shores, on the right and left, until it has penetrated to the remotest point of the Bay.

"This course, being carefully plotted upon the map, although curved, may be taken as the long axis of the Bay.

"At right angles to it, at different points, I have drawn straight lines reaching across the Bay from shore to shore, and, by use of a planimeter, I have determined the position of such a line which will exactly divide the whole area of the Bay into equal parts. This line may be taken as the corresponding short axis of the Bay, and its intersection with the long axis will be the centre of the Bay.

"When at that point, a line drawn across the bow of the supposed vessel, perpendicular to her course, would have one-half of the waters of the Bay in front of it and one-half behind it.

"Having carefully located the point in this manner, I have determined from the scale of the map, its distance from the summit point of the small island in the Bay, whose latitude and longitude are given upon the map as follows:

Latitude, 11° 03′ 10″
Longitude, 85° 43′ 38″

"It proves to be 37 seconds to the northward and 14 seconds to the eastward of this point.

"I therefore fix the position of the centre of Salinas Bay to be:

Latitude, 11° 03′ 47″ North.
Longitude, 85° 43′ 24″ West.

"Toward this point the boundary line must run, from its meeting with the Sapoa River, unless the two Commissions can agree upon a line with natural landmarks."

All the Arbiter's decisions were amicably received by both Republics, the questions in dispute are settled, and the boundary marked with sufficient accuracy for many years to come.

THE NICARAGUA CANAL

THE route for the Nicaragua Canal as projected by the present Isthmian Canal Commission is shown on the accompanying map. It generally follows the course of the San Juan River for one hundred miles from the Caribbean Sea to Lake Nicaragua about one hundred and five feet above it, then it traverses the lake for a distance of seventy miles to the mouth of the Rio Las Lajas, and after following the valley of that stream for a short distance, crosses the continental divide, forty-four feet above the lake, and descends the valley of the Rio Grande to Brito, seventeen miles from Lake Nicaragua.

The canal as proposed will have a mean depth at low water of thirty-five feet and a bottom width of one hundred and fifty feet. This width is for the straight sections; on curves with a radius of less than 12,000 feet the width is increased at the rate of one foot for each two hundred feet; thus a curve with a radius of 6,000 feet

will have a width of one hundred and eighty feet.

Starting from the Atlantic terminus the canal may be described as consisting of three stages: first, a period of ascent for a distance of fifty miles from Greytown till it enters the San Juan at a point about two miles above the mouth of the San Carlos River. This stage must be excavated. Second, a period of one hundred and twenty miles of high level, the level

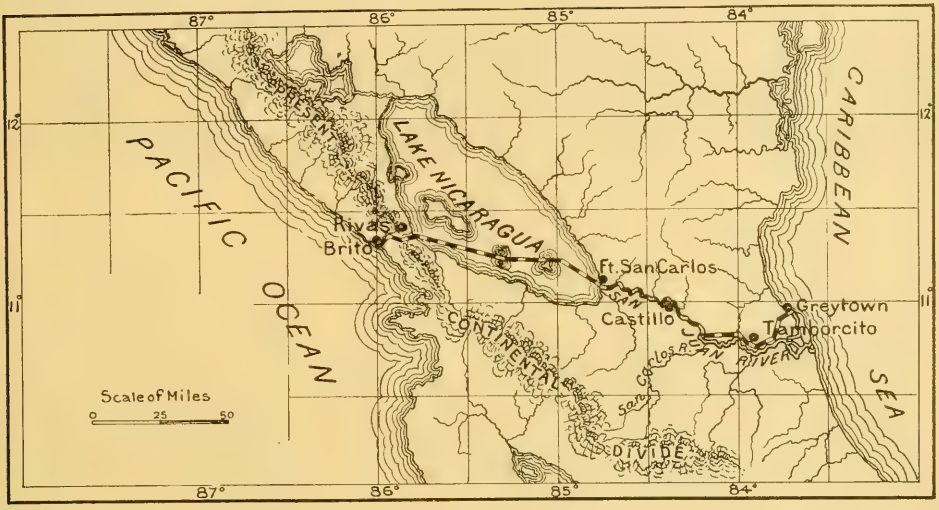
Second. The excavation of the canal prism in the swamp sections between Greytown and the Florida Lagoon.

Third. The heavy cutting near Boca San Carlos and at Tamborcito.

Fourth. The construction of the large dam at or near Boca San Carlos in connection with the regulation of the summit level.

Fifth. The Locks.

Some fifty years ago there was a



Map Showing Route of Nicaragua Canal as Proposed by Isthmian Canal Commission.

of Lake Nicaragua, secured by means of an immense masonry dam which will extend the level of the lake fifty miles down the San Juan. This stage consists of improved river and lake channels. Third, a period of descent from the lake level to the Pacific through the continental divide. This stage, seventeen miles, must also be excavated.

The salient engineering problems connected with the Nicaragua Canal project as outlined by the Commission are as follows:

First. The construction of harbors at the termini of the canal.

good harbor at Greytown, the eastern terminus of the canal, with thirty feet of water at the anchorage and about the same depth in the entrance. The entrance to this harbor where it then existed, has been obliterated and the harbor itself is now a lagoon almost entirely enclosed, of restricted area, with only about half the depth of water in it that formerly existed. Vessels for Greytown are now compelled to anchor in the offing and discharge their cargoes on lighters which are taken into the lagoon across a bar having a depth of less than six feet of water. As the prevailing trade winds are

Travelling in Nicaragua.

strong and blow almost directly on this part of the canal, the construction of a harbor at this terminus becomes necessary in the early stages of the work as well as for use after the canal is completed.

It is proposed to construct, by excavation, a harbor of sufficient area to accommodate vessels using the canal. The entrance would have a minimum depth of thirty-five feet and a bottom width of five hundred feet, guarded by two jetties springing from the shore line near Harbour Head. These jetties are to be built of loose stone to a height of six feet above mean high tide, the hearting to be composed of small and the outer portion of large stone, not easily moved by the waves. It is not expected, however, that the construction of the jetties will alone form the entrance. Dredging will also be necessary and its maintenance may require an extension of the jetties or dredging or both.

The western terminus of the canal will be near Brito. Here, as at Greytown, there is no harbor, and an artificial one must be constructed. The same general engineering principles will guide in its construction. The width and depth of the entrance will be the same. The sand movement on the western coast, however, is slight as compared with that in the vicinity of Greytown. The prevailing winds on this side are off-shore, and destructive storms seldom visit this part of the coast. The cost of maintenance of the harbor on the west side will therefore be less than that of the one on the east side at Greytown.

For a part of the distance between Greytown and the Florida Lagoon the canal line passes over swampy sections, where the material is too soft to support the embankments necessary to keep out the floods of the San Juan, and to maintain the canal level itself. Protecting embankments are therefore to be constructed over these sections. These embankments are to be located as far as practicable on the firm land composing the neighboring hills. In places, however, they cross ground which is soft to a considerable depth. Waterways are provided on the embankment lines to dispose of flood water in the protected areas.

At two places near the Boca San Carlos dam site heavy cutting is encountered, the maximum depth for short distances being

two hundred and eighteen and one hundred and seventy feet respectively; but the deepest cut of all is at Tamborcito, about twenty-six miles from Greytown. Here the high ground north of the canal approaches so close to the river that a cut through it becomes imperative. The ridge is narrow, however, the width at the top being only a few feet and at the level of the water in the canal less than three thousand feet, but the extreme depth of the cut is two hundred and nineteen feet. The borings show that it is nearly all hard rock. The less heavy cuts will also be in firm ground, but the exact character of the material cannot be stated until the borings now in progress have been completed.

The most difficult engineering work in connection with the Nicaragua Canal project is the construction of a dam across the San Juan River to hold back the waters of the lake and enable its level to be regulated. It is of great importance that this dam should be located above the mouth of the San Carlos River, as the latter discharges at times as much as 100,000 cubic feet of water per second, carrying with it great quantities of sand.

Lake Nicaragua, which forms a part of the summit level, is about one hundred miles long and forty-five miles wide, and is distant only about twelve to thirty miles from the Pacific. Originally it was an arm of the Pacific Ocean, but the shifting of the continental divide cut it off from the sea. The lake discharges through the San Juan River into the Caribbean Sea near Greytown. For the upper half of its course the San Juan winds through hilly country. Neither it nor any of its tributaries in this section carries much sediment, and a slack water navigation by means of locks and dams is practicable. But half way down its course the San Juan River receives the waters of the San Carlos which carry great quantities of

Natives of Nicaragua.

sand and thus render the San Juan useless for the purposes of a canal beyond their junction. The canal route, therefore, is compelled here to leave the San Juan, which can no longer be of service, and find to the sea an independent way.

Lake Nicaragua can furnish an unlimited supply of water to the canal. It is believed that it varies in its level as much as thirteen feet. Such an extreme fluctuation occurs, however, only at relatively remote intervals. This fluctuation will be reduced by the construction of the dam in the San Juan River just above the San Carlos, whose waters cannot be used because of the load of sediment they carry.

To reach the summit level from the Atlantic side five locks will be constructed, the first having a lift of thirty-six and one-half feet and the other four a uniform lift of eighteen and one-half feet, except the lock at the summit, the lift of which will vary with the level of the lake. The locks will be seven hundred and forty feet long by eighty feet wide in the clear, with a depth of thirty-five feet over the miter-sill. From the Pacific side the summit will be reached by four locks of uniform lift of twenty-eight and one-half feet. It is assumed that the mean level of the two oceans is about the same. The mean range of tides on the east is about one foot and that on the west side about eight feet.

The following table gives the distances on the Nicaragua route:

Number of miles of canal proper.....	67.33
Number of miles of river improved...	27.96
Number of miles not requiring improvement	17.26
Number of miles of lake channel 300 feet wide	22.19
Number of miles of lake not requiring improvement	48.74
Number of miles of harbors and entrances to same	3.05
Total number of miles from ocean to ocean, measured from the 6-fathom curves	186.53

Time necessary to pass through the canal, 33 hours.

The Isthmian Commission believe that it would take ten years to construct the canal, and that the cost would be at least $200,000,000.

THE TSANGPO

By JAMES MASCARENE HUBBARD

THE Tsangpo is in several respects the most remarkable river in the world. It is the highest of all navigable streams, flowing for nearly a thousand miles at an elevation of from 11,000 feet to 14,000 feet. During the greater part of its course its current is sluggish, but for a hundred miles or more the mighty river, in its descent to the coast plain, runs with the speed of a mountain-torrent. Though one of the largest of Central Asian streams, it has never been followed from its source to its mouth, and until recently it was doubtful of which of two well-known rivers it was the head-waters. The attempts to solve its mysteries have been attended with an almost unparalleled heroism, endurance, steadfastness, and self-sacrifice. For the principal explorers of the Tsangpo have been animated, not as those who sought the fountain-springs of the Nile, by the hope of the world's applause at their success —that was denied them—but for a simple daily wage and the consciousness of loyalty to duty.

The physical history of the Tsangpo is briefly this: It rises in the extreme southwestern corner of Tibet, close to the sources of the Ganges, the Indus, and its great affluent, the Sutlej, at a

height of nearly 15,000 feet. Receiving the drainage of the slopes of the Himalayas and of a little-known Tibetan range running parallel with these mountains, it soon becomes a stream wide and deep enough to be navigable. There is a considerable boat traffic upon it, at an elevation but little below the summit of Mt. Blanc. It flows due east for some eight hundred miles, receiving numerous large tributaries from both south and north, and when near Lhasa it is, at low water, nearly a third of a mile wide and twenty feet deep; in flood, two miles wide and of unknown depth. In longitude 94° E. it makes a sharp bend to the south, and passes through the Himalayas in a course known only to the savages who dwell upon its precipitous banks.

When last seen by an explorer it is at a height of from eight to eleven thousand feet, but when it emerges in Assam it is only four hundred feet above sea-level. From this point it pursues its sluggish way for another eight hundred miles as the Brahmaputra to the Ganges and the Bay of Bengal. There has been a long controversy, into the details of which it is not necessary to enter, as to whether the Irawadi or the Brahmaputra is the continuation of the Tsangpo. Though there has been as yet no direct evidence—the last expedient of throwing in marked logs in Tibet having failed—the general consensus of scientific opinion is in favor of the Brahmaputra, and the latest English gazetteer describes it under this name.

It is hardly to be expected that pure science will be much benefited by the lifting of the veil which hangs over this part of the river's course. But there can be little doubt that it hides scenes of magnificent beauty and grandeur which will thrill the expectant world, and give it new and nobler conceptions of the sublimity of nature.

The imagination fails to grasp the reality, as there is no other instance on earth of a large river dropping eight thousand feet in one hundred and fifty miles, plunging with the mad rush of a mountain-brook hemmed in by ranges whose peaks are from thirteen to twenty-two thousand feet in height. The native testimony is conclusive as to the existence of at least one awe-inspiring fall before Tibetan territory is left. A scientific journal* published, a few years ago, a copy of a picture of them by a native Tibetan artist who lived in their vicinity. It shows them enveloped in clouds of mist and spray, and the cliffs are covered by sub-tropical vegetation. The local lamas relate to the awe-struck pilgrim that amid the thundering water stands a king-devil, placed there under a spell by the lamas, and, when the river is low, the faithful can see his figure looming dimly through the falling waters.

It has not been from the lack of the spirit of adventure, or because of the natural difficulties presented by the region—great though they doubtless are—that no white man has solved the mystery of this part of the river's course. Its attempted ascent from the plains of Assam has been absolutely prohibited hitherto by the Indian Government on the entirely reasonable ground that there is almost a certainty that the explorer would be killed by the savage Mishmis, who are intolerably jealous of the presence of a stranger in their country. This would necessitate a punitive expedition costly in treasure and in life—an evil by no means commensurate with the gain of having satisfied what is, after all, pure curiosity. The Tibetan officials also, while preventing so far as they are able any white men from entering Tibet, for some unknown reason forbid Tibetans even to attempt to descend the river beyond their own frontier.

The Tsangpo has been explored, however, with the exception of this one hundred and fifty miles, notwithstand-

* Geographical Journal, vol. 5, p. 258.

ing the opposition of the Tibetans and the difficulties presented by the highest mountain region in the world, though not by white men. At any time within the last thirty-five years the trans-Himalayan traveller might have met a caravan of Tibetan and Indian traders with their pack-laden sheep climbing or descending some steep mountain-pass, or crossing the Tsangpo on rafts. Walking humbly with the servants and slaves, for to walk is a mark of servitude with those people, there would be an Indian with tea-bowl and prayer-barrel suspended at his girdle, counting his rosary as he walked, differing in nothing apparently from his companions except in his more intelligent face and the greater interest with which he noted everything about him. But open his prayer-barrel, which he piously twirls when he comes to some particularly dangerous spot, and there will be found in it, instead of the scroll with the Buddhist prayer, "Om mani padmi hom," notes of the journey after the boundary was crossed, observations with sextant and compass, and a simple route-survey showing the length of each day's march, the relative position of the prominent peaks, the course of the streams, and their approximate breadth and depth. Examine closely his rosary, and one would discover to his surprise that, instead of the orthodox one hundred and eight beads, there were only a hundred, and that he dropped one at every hundred steps, which were uniformly two and a half feet long. If he were watched carefully he would be seen to steal from camp at night, when all else were sleeping, if biting wind, freezing cold, and driving snow permit, with his box and tea-bowl. Taking from beneath the false bottom of his box a few instruments, and pouring some quicksilver into his tea-bowl for an artificial horizon, he makes an observation of some star, notes the condition of barometer and thermometer, compares his chronometer with his watch, and then goes back to camp to write up his journal, and at length to sleep. Years after, the traveller might see this same man at the Great Trigonometrical Survey in Calcutta reading to an English officer his journal, explaining his observations and route-survey, and narrating his adventures—in one instance these included a seven years' slavery in Tibet. He asks who he is, and is amazed to learn that he is only a school-master in a little Himalayan village in the district of Kumaon.

What is his reward for these year-long toils, sufferings, and dangers, this daily risking his life in an attempt to add to the world's knowledge? A little piece of land, possibly a small pension, and, while he is able to serve—oblivion. But soon the scientific journals will be full of accounts of the wonderful journey of the native Indian explorer, the great extent and marvellous accuracy of his survey, his pluck and endurance, his fertility of resource, and, above all, his single-hearted devotion to the cause of science. If his services are publicly recognized by some great Society, with the names of world-renowned explorers, we read merely, "The Pundit employed by Captain T. G. Montgomerie—a gold watch—for his route-survey in Great Tibet." *

It was in 1861 that the successful opposition of the Tibetans to the exploration of the trans-Himalayan region, by Europeans, as well as the fact that Indian traders were permitted to travel freely throughout Tibet, suggested to an officer connected with the Great Trigonometrical Survey of India the expedient of employing native surveyors.

The village school-master, Nain Singh, who had been in the service of the brothers Schlagintweit during their explorations in Kashmir, was the first man to re-

* Royal Geographical Society Year-Book, 1899, p. 208. It should be said, however, that in 1877 the patron's medal was bestowed on the Pundit Nain Singh—then incapacitated for further service. Two others are also mentioned by name in the list of recipients of awards.

ceive the necessary training for the work. At the head-quarters of the Survey he was taught the use of the sextant, compass, etc., to recognize all the larger stars, to walk with paces of uniform length, and to make a simple route-survey. When these things had been sufficiently acquired, he was sent to explore the Tsangpo from its source to India, if possible. It was 1865 before he succeeded in establishing himself in Tibet as a trader desiring to buy horses and at the same time, as a pious Buddhist, to do homage to the Lhasa Lama. His "instrumental equipment consisted of a large sextant, two box sextants, prismatic and pocket compass, thermometers for observing temperature of air and of boiling water, pocket chronometer and common watch, with apparatus, the latter reduced as much as possible." After numerous adventures he finally reached Lhasa, where he had an interview with the Grand Lama, whom he described as a fair and handsome boy of about thirteen years of age, seated on a throne six feet high, attended by two of the highest priests, each holding a bundle of peacock feathers. In this journey he was able to follow the course of the river only to the neighborhood of Lhasa, some six hundred miles. Nor did he succeed in tracing it farther in a second journey made seven years later—a journey memorable, however, from the fact that he made a route survey of 1,319 miles, 1,200 of which were through country never previously explored, and took four hundred and ninety-seven observations. During all this time he was known to the scientific world only as the "pundit," but the sufferings of this last journey having so affected his health as to compel him to give up his connection with the Survey, his name was disclosed. He has been followed by others, among whom those known as A—k, D—m—g, and K. P. have accomplished the most in trans-Himalayan exploration, all men of like courage, endurance, and animated by a single-minded devotion to their duty. But none have succeeded, as yet, in tracing the Tsangpo's course through the mountains to Assam.

But there are indications of a change of feeling of the rulers of Tibet toward the Indian Government which promises free intercourse between the two countries in the not distant future. As the deadly hostility of the Mishmis to strangers penetrating their mountain fastnesses has been largely due to Tibetan influence, we may look in time to a similar change among them to friendliness. If this should be the case, we trust that the man who lifts the veil which shrouds this wondrous passage of the river through the Himalayas may be one of that noble band, a native Indian surveyor.

RECENT CONTRIBUTIONS TO OUR KNOWLEDGE OF THE EARTH'S SHAPE AND SIZE, BY THE UNITED STATES COAST AND GEODETIC SURVEY.

By C. A. Schott

THE Survey has just published a quarto volume containing an account of the transcontinental triangulations and measurements of an arc of the parallel in latitude 39°. It also has ready for publication the manuscript giving the result of an oblique arc in the eastern part of the United States. Both are contributions of great length and among the first of their kind in America.

At first sight it might appear rather late in the history of the Survey to bring out results of the earth's figure. But it should be remembered that such measures were not the prime object of the Survey in its early stages of activity, but came about in the natural course of continuous development during nearly two-thirds of a century. What was required was to secure a series of geodetic measures consistent within themselves and serving as a bond binding together the separate detail surveys so as to form ultimately a systematic whole. This requirement demanded the establishment of extended primary triangulations not only along our coasts, but also as a connecting link across the country from ocean to ocean, to secure uniformity of results. The growth of these operations depended of course upon the immediate requirements of the Survey for the production of harbor and coast charts and was subject to the means available from year to year.

Thus when I state that the first was made between the years 1844 and 1898, and the second between the years 1833 and 1898, I do not mean that it took fifty-four and sixty-five years respectively to complete the task. Indeed, in either case there were many years of interruptions. What these long intervals signify and emphasize, is, that the various operations of the Survey were more urgently required in the production of practical results for immediate use and in a great measure as aid to navigation. For the more technical part of the work the available knowledge of the earth's magnitude was sufficient for the early needs. At the same time it was recognized that the measurement of the earth required the same means and methods as that of an extended country, viz., a net-work of primary triangulations and a number of astronomical determinations for latitude, longitude, and azimuth of its points. In time, therefore, sufficient material would accumulate to direct special attention to this, the highest feature of geodesy.

After the triangulations had reached hundreds of miles in extent, and the geographical positions had been determined by their development upon the surface of a spheroid representing the shape and size of the earth, it became a matter of importance to see that the direct astronomical measures for latitude and longitude kept in close accord with the corresponding geodetic measures; thus it came about that in February, 1880, the Survey changed its first reference spheroid, that of Bessel, for a more suitable one, that of Clarke of 1866.

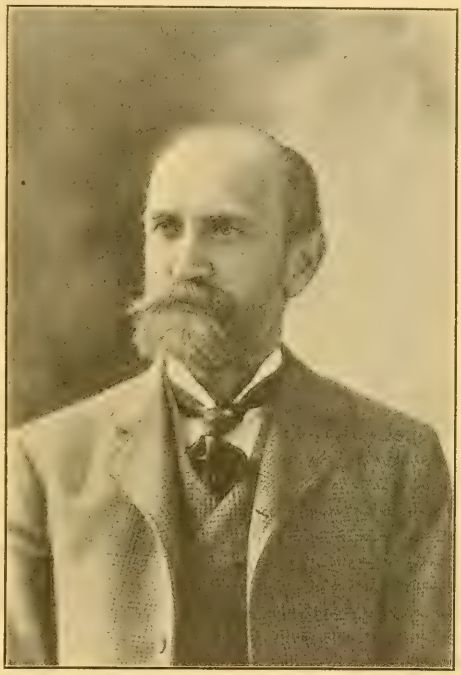
When in 1889 the United States, by resolution of Congress, consented to become a member of the International Geodetic Association for the measurement of the earth, the subject of the measures of

arcs came into greater prominence, and thus the field work of the two arcs, then fairly under way, was accelerated and brought to a close late in the year 1898.

Before entering upon the detail of the two arcs it may not be out of place to state that in order to obtain a measure of the dimensions of the earth, as represented by a spheroid, that is, by a surface generated by the rotation of an ellipse about its minor axis, it is essential that we should be in possession of at least two arcs or of an equivalent thereof. For combinations of two arcs of the meridian, their mean latitudes should differ widely; the same is true for the combination of two arcs of the parallel. We may also obtain an arc of the meridian with one of the parallel, but in every case the measures should be of considerable extent. Arcs of less than 5° (about 556 km., or 345 st. miles) would now be regarded as short ones. It has been stated that one of our arcs is an oblique arc, and as it possesses a great range of latitude and also of longitude and is supplied with a large number of astronomic measures, it is of itself sufficient for the deduction of values for the dimensions of the earth. Furthermore, it may be remarked that for any relatively small part of the earth's surface an osculating spheroid may be determined, as, for instance, was done for our oblique arc. Such a spheroid has the property that its surface is in best accord, as regards curvature, with the actual or physical one, the latter considered as a mathematical surface of equilibrium and generally known as geoid.

The definition of an osculating spheroid thus implies that the sum of the squares of the difference between the various astronomic and geodetic measures be a minimum. The mathematical treatment of the combination of the arc measures differs according to their nature, whether they are extended in a certain direction or whether large areas are covered, but in its generality it is necessarily laborious.

The salient points of the two arcs under consideration and the results reached may now be briefly stated. First, the arc of the parallel in latitude 39°.* It extends from Cape May, N. J., on the Atlantic coast, to Point Arena, Cal., on the Pacific coast, and ranges over 48° 46′ of longitude, with a linear development of about 4,225 kilometres, or 2,625 st. miles. The triangulation is supported by ten base



O. H. Tittmann, Superintendent, U. S. Coast and Geodetic Survey.

lines with an aggregate length of 53½ st. miles, the longest or Yolo base being 10.9 miles in length; one-half of these lines having a smaller probable error of measure than one part in a million. A

*U. S. Coast and Geodetic Survey; H. S. Pritchett, Superintendent. The Transcontinental Triangulation and the American Arc of the Parallel. By C. A. Schott, Assistant, Coast and Geodetic Survey, Washington, D. C., 1900.

characteristic of the triangulation is its rigidity imparted to it by quadrilaterals and other polygons. In crossing the Rocky Mountains many of its sides exceed one hundred miles in length, and there is one side reaching to a length of 294 km., or 183 st. miles; the altitude of many of the stations is also considerable, reaching to 4,300 metres, or 14,108 feet, in the case of Pike's Peak, and to 14,421 feet at Mount Elbert. All geometrical conditions subsisting in the triangulation are satisfied by adjustment, inclusive of the required accord of the base lines, so that the same length for any given line is found no matter from what line one may start. This involved much heavy work; for instance, the triangulation adjustment between the Salina and the El Paso base demanded the simultaneous solution of ninety-nine normal equations (with as many unknowns). In addition the figures required the evolution of a correction to each of the two hundred and twenty-five observed directions.

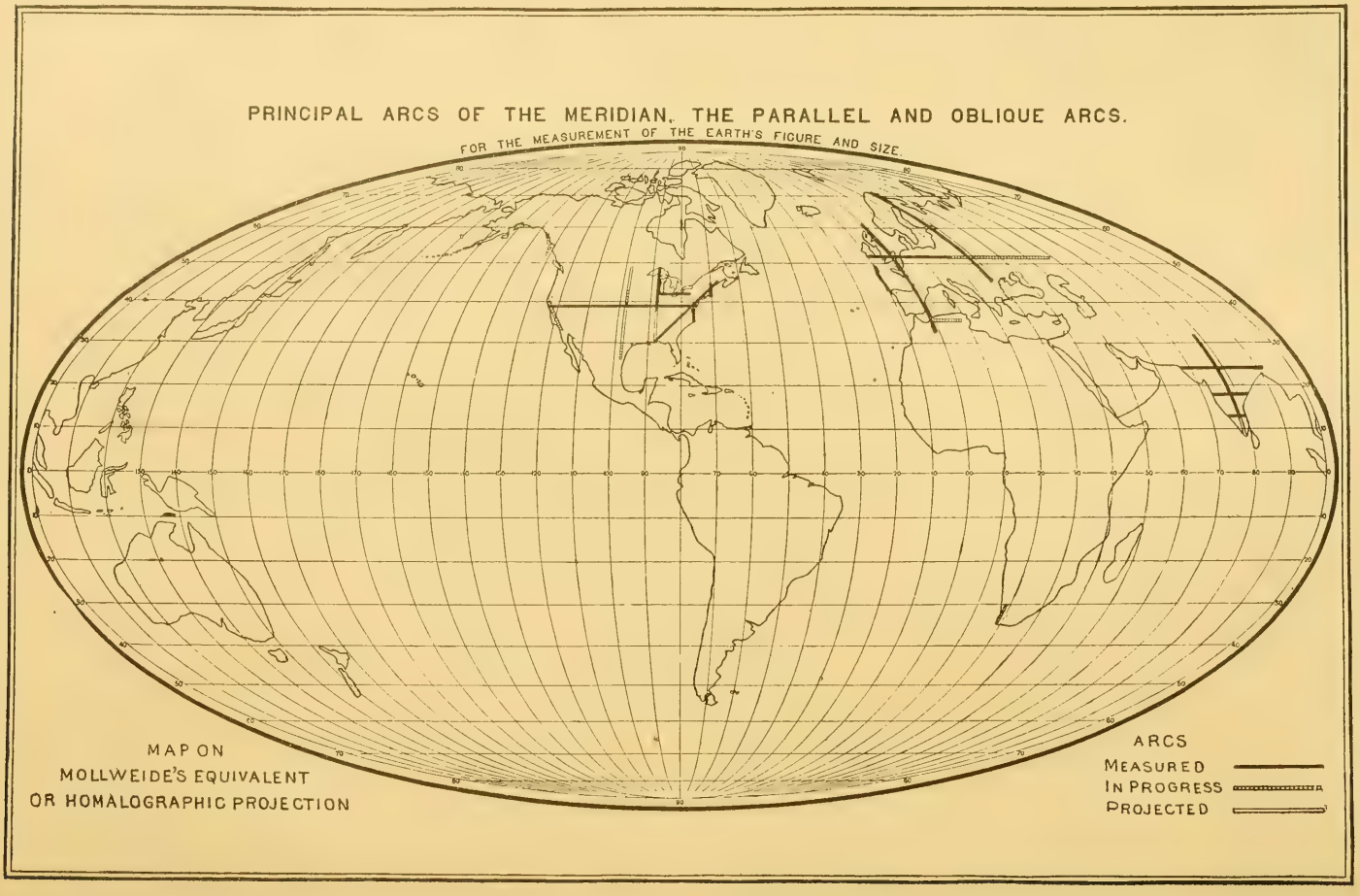
Coming to the astronomical measures, we have distributed over or near the arc one hundred and nine latitude stations, occupied almost exclusively with zenith telescopes; there are, also, seventy-three azimuth stations, various methods having been used, and lastly we have twenty-nine telegraphically determined longitudes. These, of course, are of paramount importance for an arc of the parallel. There cannot be too many longitude stations in consequence of that great stumbling-block in geodesy, the local deflections of the vertical or plumb-line. These deflections of the zenith from a normal direction have been divided into two groups: Those which are regional or manifest themselves with marked common features over thousands of square miles, and those which are quite local and greatly depend upon the surface features immediately surrounding them.

These deflections, even in level countries, average about 2.5″; but in mountainous regions this deflection is greatly surpassed. Thus we find for deviation of the plumb-line at Patmos Head station 12″ to the north, at Colorado Springs 25″ to the west, at Salt Lake City about 17″, and at Ogden about 15″ to the east, at Genoa Station, Nev., nearly 29″ to the west, the quantities depending to some extent on the spheroid of reference; but their amount and direction are obviously well accounted for by the position of the known attracting masses. In connection with this, continental attraction may manifest itself and be recognized by the astronomic amplitude of the longitudes of extreme stations of a long arc being in excess of the corresponding geodetic amplitude. The matter cannot be further pursued here in detail, but it may suffice to state that the average curvature of the equipotential surface of the geoid along the parallel of 39° approaches for about four-sevenths of the arc from its eastern

A NOTE CONCERNING THE CHART ON THE OPPOSITE PAGE

THE value of the Chart of the World, shown on the opposite page, is that the areas of all parts of the world appear in true proportion.

The projection is the invention of Professor C. B. Mollweide, in 1805; numerous applications of it were made by Babinet in 1857, which gave rise to his name being attached to it under the designation Babinet's homolographic projection. It is an equal surface projection in which the entire surface of the earth is represented enclosed within an elliptic outline, whose major and minor axes represent the equator and central meridian respectively, with a ratio of 2 to 1. The parallels are straight lines, and the meridian, ellipses, and each zone or subdivision of the projection is in due proportion to the corresponding area on the sphere. The distances of the parallels from the equator-line are computed from the formula characteristic of the projection. C. A. S.


PRINCIPAL ARCS OF THE MERIDIAN, THE PARALLEL AND OBLIQUE ARCS.
FOR THE MEASUREMENT OF THE EARTH'S FIGURE AND SIZE.
MAP ON
MOLLWEIDE'S EQUIVALENT
OR HOMALOGRAPHIC PROJECTION
ARCS
MEASURED
IN PROGRESS
PROJECTED

end closely to that of the Clarke spheroid; whereas, for the remaining three-sevenths, or for the region across the Rocky Mountains to the Pacific, the curvature comes more nearly to that of the Besselian spheroid. In the published paper two tables are given containing the results needed for combination with any other arc and, in conclusion, some preliminary rough combinations of American arcs are presented; all of which point to a reference spheroid of larger dimensions than those of the Besselian and are in favor of continuing the use of Clarke for reference.

The second arc under consideration extends from Calais, Me., in the northeast and opposite the Canadian boundary, to the Gulf of Mexico, and terminates at New Orleans, La. It is known as the Eastern Oblique Arc of the United States. Its length is 2,612 km., or 1,623 statute miles; its difference of latitude is 15° 1′, and of longitude 22° 47′. The general direction is, therefore, favorable and the length ample to secure fair results for an osculating spheroid. In the main the triangulation follows the Appalachian chain of mountains; in Western North Carolina and Eastern Tennessee it bifurcates, leaving an oval space between the two branches. The length of sides depends upon six base lines, and in general the development is closely accommodated to the hypsometric and other natural conditions along the course. It includes among its stations the two highest points in the eastern part of the United States, viz., Mount Washington, N. H., rising to about 1,920 metres, or 6,300 feet, and Mount Mitchell, N. C., rising to about 2,038 metres, or 6,687 feet.

The adjustment of the whole triangulation is effected precisely as explained in the use of the arc of the parallel; the small reduction to the sea-level of the observed horizontal directions, on account of the altitudes sighted, was only applied when exceeding 0.05″. The principal labor of adjustment was demanded by the necessity of bringing into accord the measured lengths of the Fire Island, the Massachusetts and the Epping base lines, and fulfilling the geometrical conditions of the intervening net of triangles. This demanded the satisfying of fifty-seven conditions and involved the simultaneous solution of an equal number of normal equations and the working out of one hundred and thirty-one corrections of observed directions. Of astronomic measures we have seventy-one latitude stations, seventeen longitude stations, and fifty-six azimuth stations, tolerably well distributed over the whole extent of the arc. The latitudes, as were those of the arc of parallel, were corrected for height of station or curvature of the vertical and for variation of pole according to Dr. Chandler's and Dr. Albrecht's researches. The same scrutiny as before had been extended to the deflections of the vertical, both regional and local. Partly on account of avoiding unnecessary labor, but principally on account of the crowding together of astronomic stations in certain very limited localities, and all of them, therefore, partaking of the deflections characteristic of this area, the total number of astronomic stations admitted into the final equations for the determination of the best spheroid were thirty-six for latitude, fourteen for longitude, and thirty-four for azimuth, or eighty-four conditions in all.

These eighty-four differences between the astronomic and geodetic results constitute the data needed for a new determination of a spheroid; next the functional relations between the positions of these stations upon the reference spheroid to the earth's equatorial radius and to the compression of the polar axis had to be established.

The final normal equations contain, therefore, four unknown quantities, viz.: the correction to the meridional deflection of the vertical at the initial or reference station of the oblique arc; second, the corrections to the deflection of the ver-

tical, in the plane of the prime vertical, at the same place; third, correction to the equatorial radius of the reference spheroid; and, last, the correction to its compression.

In the combination of conditional equations arising from observations of a different nature, the question of their relative weights must be considered. In the present case, four assumptions were made and the consequent normal equations solved, viz.: for equal weights, for weights one-half, one-third, and one-fourth to the azimuth equations, the latter being necessarily inferior to the equations derived from latitudes and longitudes. A comparison of these four results showed that it was of small consequence which of these hypotheses was finally adopted, since the corrections to the equatorial radius of the reference spheroid were practically the same for any of these hypotheses, and nearly the same could be said of the resulting compressions. The weight one-third to each of the azimuth equations was finally decided upon, and the resulting dimensions of an osculating spheroid were found to be: Equatorial radius, 6,378,157 ± 90 metres; compression, 1/304.5 ± 1.9. The equatorial radius, therefore, differs but forty-nine metres from Clarke's value of 1,866 adopted on the Survey, while the Besselian value is apparently too small by eight hundred and nine metres. On the other hand, the compression or the ratio of the difference of the equatorial and polar semi-axes to the former is in favor of Bessel's spheroid, of which the compression is 1/299.2; that is, one more closely approaching a sphere.

In the present state of our knowledge there is no reason to suppose that the curvature of the northern part of America differs any more from that of a general spheroid derived from arcs of all kinds so far measured than local ones in either hemisphere differ among themselves. A comparison of a number of such locally adopted spheroids will bring to evidence the local deformities in the shape of the earth's equilibrium surface and furnishes the geodesists endless material for the study of the earth's actual figure.

The manuscript concludes with a comparative table of the dimensions of several spheroids which of late have come more into prominence. It is as follows:

Spheroid of	Equatorial radius, a, in metres.	Polar semi-axis, b, in metres.	$a-b$.	Compression $(a-b)/a$.
Bessel, 1841. From ten arcs of the meridian and total amplitude 50° 34′	6,377,397	6,356,079	21,318	1/299.15±3.15
Clarke, 1858. Special spheroid for surface of Great Britain and Ireland; range of latitude 12°, the same in longitude; seventy-five astronomic stations	6,378,494±90	6,355,746	22,748	1/280.4±8.3
Clarke, 1866. From five meridional arcs, of total amplitude 76° 35′	6,378,206	6,356,584	21,622	1/295.0
Clarke, 1880. From five meridional arcs and longitudinal measures, total amplitude 88° 59.8′ (equatorial degrees)	6,378,249	6,356,515	21,734	1/293.5
United States Coast and Geodetic Survey, 1900. Eastern oblique arc of the United States; total length, 23° 31′, and eighty-four astronomic stations	6,378,157±90	6,357,210	20,947	1/304.5±1.9
Harkness, 1891. From "The Solar Parallax and Related Constants," Washington, 1891, p. 138. From a variety of sources	6,377,972±125	6,356,727±99	21,245	1/300.2±3.0

N. B.—The ± indicates probable errors.

EXPLORATIONS IN CENTRAL EAST AFRICA

DR. DONALDSON SMITH has returned to Philadelphia from a journey of 1,500 miles through Central Africa, from Berbera, on the Somali coast, to the Nile via Lakes Rudolf and Stephanie; the last half of the journey was over new country never before explored.

After considerable difficulties with the local officials, which involved the fitting out of three distinct expeditions, Dr. Smith started from Berbera on August 1, 1899. Owing to the desertion of his Sikh followers, he began to cross the Haud with only seventeen Somalis and as many Gurkhas and Sikhs, besides his assistant, Mr. Frazer, and a Goarnese cook. The expedition marched by way of Milmil, Sesahane, and Sheneli to the Shebeli River, the followers being increased to forty-eight on the way. The Shebeli was reached on September 8th at a spot called Godi, over four hundred miles from Berbera by road, and on September 11th the expedition started west again, and between Gohulle and El Dere followed the line of march traversed by Dr. Smith in 1895.

In the first journey he saw the worst side of the Abyssinian method of annexation, but his more recent observations showed him that the Abyssinians' treatment of tribes once brought thoroughly to submission was commendable. In the first attacks the Abyssinians were certainly very cruel, but later they restored to the natives a large proportion of their belongings and very nearly their original self-government, only a moderate tax being imposed. From the Somalis to the Boran he was surprised to find the natives quite as rich apparently as they were before they came under Abyssinian rule.

Leaving El Dere, which is about equidistant (750 miles) from Berbera and the Nile, the expedition marched through broken and very wooded country, abounding in elephants, and here the Somali followers gave much trouble. They were never satisfied unless they had over ten pounds of camel meat or mutton a day each, and when food was scarce Dr. Smith had to be on the alert constantly to prevent them from poisoning transport animals or stealing sheep. But the Somalis were not such miserable thieves as most of the Indians, and their superb physical condition, swift-footedness, endurance, and intelligence were remarkable. Of the nine Gurkhas four only were pure blooded, and these were among the best men in camp. But the others, with some of the Sikhs, continually tried to hide if the march were long, and had to be hunted up. Two who evaded the search parties were never heard of again.

After leaving Goff, the expedition reached an altitude of over 5,000 feet in the Boran highlands, when suddenly the caravan was brought to an abrupt halt by a precipice that sheered off almost perpendicularly to a broad plain 1,700 feet below. Five marches were occupied in crossing this plain, where Dr. Smith obtained a specimen of a tiny gazelle which had been proved to be new to science.

On November 26th the valley of Lake Stephanie was entered, and here the expedition endured much hardship by the burning of the camp and the shortness of water, for the water of the lake was found to be so briny that it was undrinkable. Lake Rudolf was reached on December 10th. The formerly rich tribe of Rusia was found no longer to exist, and no human beings were seen until the river Nianam was reached.

A remarkable change in the fauna was now observed. Between the Nianam and the Nile there was not only a completely different set of birds, but scarcely any of

the mammalia were the same as had been found in the eastern section of the journey. On January 3d the Omo River was left behind. It was now found that as the expedition approached, the natives fled to the hills and seemed inclined to fight. They appeared to be a branch of the Turkana. One day a number of them attacked two of Dr. Smith's camelmen, and were only driven off by firing; but this was the only case of attempted hostilities on the whole journey.

After leaving the highlands and crossing at right angles the line of march of the late Captain Wellby, the Magois were encountered. They have the heavy build and large features, with high cheek-bones, of the Soudanese, and, above all, the lines of raised tattooing on their cheeks that is so typical of the people about the Nile. Dr. Smith thinks it not unlikely that they are a branch of the Dinkas, who, perhaps being driven from the Sobat by the Neurs, put the desert between themselves and their persecutors. They seem to care principally for small red beads, and work them in gorgeous patterns on leather plaques, with which the warriors adorn their massive dead-dresses.

The most *outré* of our fashionable young men can never aspire to the height of collar worn by some of the Magois. Their collar of beads throws the chin high up in the air, and their locks are done up in a great chiffon, composed principally of clay covered with ostrich feathers. Parallel lines of raised tattooing on the chest and abdomen, leopards' skins hung over the back, and a bell hung on a slender cord around the waist help to enrich the men's apparel. They are the only people Dr. Smith has ever seen wearing a zebra's tail suspended from the elbows. Many of the younger girls have rather attractive features and pretty figures. The worst burden they have to carry in life seems to be the countless necklaces of beads which spread over their bosoms to the waist, and the large bracelets and anklets of ivory, brass, and iron. Their hair is shaved above the ears and cut fairly close on the top of the head.

Contrary to the advice of these natives the expedition set out into the plain westward, and here they suffered much from the difficult ground and the scarcity of water, and many transport animals and much valuable baggage were lost. After searching for a better route for many days, a branch of the Magois calling themselves Katua were encountered, and Dr. Smith was surprised to find them cow-worshippers, indulging in certain rites supposed to be peculiar to the Hindu religion. On reaching the most northern extension of the Uganda highlands on February 15th, the Akara were met with. Many of these natives were agriculturists as well as stock-raisers, and had substantial wooden dwellings. Villages were passed which might easily have contained 1,500 inhabitants. Dr. Smith secured at this stage of the journey the only specimens ever obtained of the spotted bushbuck. On March 2d Lockall was reached, and there Dr. Smith received a visit in state from King Amara, who commanded perhaps 25,000 warriors. Fort Berkeley was reached on March 14th last. As no steamers had come up, however, the followers of the expedition had to be sent down to Mombasa after waiting a month. But on May 5th a gunboat arrived and Dr. Smith and his collections were carried down to Cairo. That site was reached just ten months after the departure of the expedition from the Somali coast.

Dr. Donaldson Smith has not only thoroughly explored a large tract of Africa, but he has made a most valuable series of surveys and some very interesting collections. Dr. Smith has earned a very high position as an explorer of unknown countries, and deserves the warmest praise of geographers.

GEOGRAPHIC NOTES.

THE DUKE OF ABRUZZI.

THE Duke of the Abruzzi will despatch from Christiania in the spring a relief party to search for the three members of his North Polar expedition who were lost in March, 1900. These were Lieutenant Querini, a Norwegian engineer, and an Italian machinist. Captain Cagni's party set out from Teplitz Bay, 82° 4′, where the *Stella Polare* was blocked, March 11th, and during the first nine days advanced 43.5 miles. As the party was too numerous for rapid advance, he determined at this point to send back the three men whom he judged were least able to stand the strain of marching. It had been agreed when Cagni and the Duke separated that only those most enduring and competent should continue with Cagni on the march. The three were started back in good spirits, good health, and abundantly provided with provisions, but they were never heard from again. Captain Cagni believes that they must have fallen into a chasm and perished. Letters were left at Teplitz Bay with instructions for the men to proceed to Cape Flora. Provisions sufficient for twenty men for three years were also left with the letters and enough more for three men for four years at Cape Flora.

Lieut. Franco Querini.

The preliminary report of the expedition recently published by the Duke of Abruzzi in the Italian *Militare e Marina* has added but little to the account already given in the NATIONAL GEOGRAPHIC MAGAZINE (vol. xi., pp. 411–413). The advance of Cagni is especially remarkable for the speed which his party was able to maintain. For days they averaged 9.5 miles in twenty-four hours, a phenomenal rate of advance over polar ice and snow. Latitude 86° 33′ was reached April 26th. No land was here in sight, nothing but ice in a state of thaw. Petermann's Land, which Payer believed he saw, did not exist where he stated or Cagni would surely have seen it early in his journey. The same must be true of King Oscar Land.

TRANS-SIBERIAN RAILWAY.

WORK will be resumed on the branch of the Trans-Siberian railway from Stretensk to Khabarovsk. This route was abandoned for a more direct line to the Pacific through Manchuria when Russia acquired

practical control over Manchuria after the Chino-Japan war. The disturbances in this province during the past summer have shown the Russian Government that for a number of years the route through Manchuria is liable to be cut by bands of Chinese at any moment. Hence if there is to be regular railway service from St. Petersburg to the Pacific a safer route must be maintained. The northern route, which is a part of the original plan, follows the left bank of the Shilka and Amur Rivers and thus keeps entirely in Russian territory. It protects and is in turn protected by the line of Russian steamers and barges which regularly ply up and down the Shilka and Amur between Stretensk and Khabarovsk.

NATIONAL GEOGRAPHIC SOCIETY LECTURES.

THE National Geographic Society announces the following lectures: "The Explorations and Missions of the Franciscan Fathers in Mexico," by J. Stanley-Brown, Friday, January 4th; "The Routes for an Isthmian Canal," by Arthur P. Davis, Friday, January 18th; "The Characteristics, Recent Progress, and Present Condition of Mexico," by Señor Dr. Don Juan N. Navarro, Mexican Consul-General at New York, Friday, February 1st. These lectures are held in the Congregational Church, at eight P.M. Technical meetings for the reading of papers and general discussion will also be held on the evenings of January 11th and 25th. The place of meeting and subjects will be announced later.

SVEN HEDIN.

IT was feared that Sven Hedin had lost his life in the chaos throughout the Chinese Empire during the past summer. But he has reached his headquarters, Yangi-Koll, Central Asia, safe and sound, and is as enthusiastic and vivid in his descriptions as ever. He reports that he has passed the summer, unmolested, in the vast Desert of Gobi.

It will be remembered that Sven Hedin went to Central Asia in August, 1899, purposing to stay three years there verifying and continuing the explorations he made in that region during 1893–1895. His narrative of those years, *Through Asia,* has been published in half a dozen languages, and has made him world-famous as one of the great explorers of history, comparable to Marco Polo, von Richtofen, and Livingston.

Dr. Hedin writes that he has definitely located the original bed of the mysterious and shifting Lake Lobnor, about the location of which geographers have so long wrangled. Along the south end of the lake once ran the ancient caravan route from Central China westward, formerly thronged with camels carrying silk to the markets of the west. On the banks of Lake Lobnor were found the ruins of houses, temples, and watch-towers, evidently the remains of a city rich and prosperous 2,000 years ago. The rivers in that region are very perceptibly drying up at their southern ends, Dr. Hedin states, and growing bigger and bigger at the north. He concludes that the hydrographical system is moving toward the northeast.

THE COAST OF PORTO RICO.

THERE was no relaxation in the activity displayed by the United States Coast and Geodetic Survey in its surveying operations in Porto Rico during the summer of 1900. During the season thirty-six triangulation stations were occupied and one hundred and one geographical positions located. A base line was measured and an azimuth determined. Large scale surveys were made of the approaches and surroundings

of Guanica Bay and Mayaguez, and a small scale survey of that portion of the main mountain range visible from the south coast. The difficulties of the work may be imagined when it is stated that for several hours each day, for nearly three months and a half, it was necessary for the topographer and his aids to work in water almost waist deep.

THE CENSUS OF INDIA.

THE third general census of India will be taken on the night of March 1st. Ten years ago the population of India was about 287,000,000, but this census will probably show not more than 300,000,000, as the ravages of famine and cholera during the past decade have been great. In other words, the increase of population in India during 1891–1901 is estimated at about the same as the increase in the United States during the same period, though the latter had less than one-fourth as large a population as the former. The immensity of the task involved in counting the people of India, one-fifth the population of the world, may be grasped by comparison with the immense work of taking a census of the United States. Nearly a million men and boys will be employed as enumerators, clerks, etc. The well-known suspicion and reluctance of the Indian people to answer the questions of the census taker are gradually wearing away, and the Indian Government confidently hopes for good results from the census of 1901.

LAKE TANGANYIKA.

CONVINCING evidence of the shrinking up of Lake Tanganyika was presented in a paper recently read in Brussels by Captain Hecq. The post of Karema was built twenty years ago on the shores of the lake, but when Captain Hecq last visited the place, a few months ago, the waters had so receded that the post was fourteen miles distant from the lake. The slave-trade in the vicinity of Lake Kivu is dead. Domestic slavery, however, Captain Hecq states, still continues, but will soon disappear.

A REPUBLIC IN MANCHURIA.

A FLOURISHING little republic in Manchuria, it is asserted, has been discovered by the Russians. It lies along the upper reaches of the Sungari River, below Kirin, which is on the line of railway from Onon to Port Arthur. The Government, according to report, is properly organized with a President, Courts of Justice, Trade Guilds, tax collectors, and other officers of a State. It supports a small army, which last summer joined the Chinese forces to oppose the Russian advance, and fought with much valor. Probably the Republic was founded seventy years ago. It now numbers about 100,000 and, oddly enough, has always been favored by the Imperial Government.

ORGANIZATION OF FRENCH CONGO.

BY a recent decree of the French Government a new administrative province has been formed in North Central Africa, entitled "Territoire Militaire des pays et protectorats du Tchad." It includes the basins of the Kemo, a tributary of the Ubangi, and of the Shari, and also Wadai, Bagirmi, and Kanem, which by the Anglo-French agreement of 1899 were included in the French sphere of influence. The object of this organization is to enable France to cease sending military expeditions to this region. All the soldiers henceforth of this province will be natives, officered, of course, by Frenchmen.

THE FORESTS OF THE PHILIPPINES.

THE Philippine Bureau of Forestry has submitted its first report on the forest wealth of the Philippine Islands.

The Bureau was organized by order of the Military Governor, April 14, 1900, to ascertain the condition of the forests and the regulations adopted by the Spaniards for their preservation.

It is estimated that from one-fourth to one-half the area of the Philippine Islands, or from twenty to forty million acres, are public forest lands. In the islands of Mindoro and Paragua at least 5,000,000 acres of virgin forests are owned by the State.

The island of Mindanao with an area of 20,000,000 acres, is almost entirely covered with timber. Even in the province of Cagayan, Luzon, there are more than two million acres of forests. In some of the southern islands magnificent tracts are standing with from 10,000 to 20,000 cubic feet an acre of splendid timber. The trees tower to a height of one hundred and fifty feet, often shooting up sixty feet without a single branch and of a diameter of four feet.

Captain Ahern, Director of the Bureau, believes that there are as many as five hundred species of trees in the archipelago. No pure forest of any one species exists. Rarely do more than three or four trees of one variety grow together. Many varieties of valuable gum, rubber, and gutta-percha trees are found; also seventeen dyewoods and the ylang ylang from whose blossoms so many perfumes are made.

It is stated the regulations adopted by the Spanish for the preservation of the forests of the Philippines were in line with the most advanced forestry legislation of Europe. But these rules were not enforced. The men licensed to cut, hewed indiscriminately; with the result that the most valuable rubber, gutta-percha, and ylang ylang trees were used for firewood. The old regulations have been revised by Captain Ahern. Lumbermen are now licensed to cut only certain species.

SOUTH POLAR EXPLORATION.

THE arrangements for the British and German South Polar Expeditions which sail from Europe in August, 1901, are nearly completed. It is expected that the English boat, the *Discovery,* will be launched in March at Dundee. She is a good strong boat, built on different lines from the *Fram,* for the latter was planned to resist, or rather escape, tremendous ice-pressure, while the *Discovery* was modelled to withstand the attacks of a boisterous sea. The German boat, building at Kiel, is smaller and lighter than the *Discovery* and follows somewhat the lines of the *Fram.*

The two ships sail from Europe together. The official statement of their plan of co-operation is as follows:

"When they reach the far South they will separate with a carefully arranged plan of work for each. The Antarctic regions have been divided into four quadrants. First, the Victoria quadrant, which extends from 90 degrees east to 180 degrees, and includes Victoria Land; second, the Ross quadrant, from 180 degrees to 90 degrees west, south of the Pacific Ocean; third, the Weddell quadrant, from 90 degrees west to 0 degree (Greenwich meridian), the Weddell Sea; and fourth, the Enderby quadrant, from 0 degree to 90 degrees east, which includes Enderby Land. Two quadrants have been assigned for exploration and research to each expedition, the British taking the Victoria and Ross, and the German the Weddell and Enderby."

Both expeditions hope to be able to spend three years in the work. Captain Drygalski, the famed explorer of Greenland, leads the German party, while Captain Scott of the British Navy, young, hardy, and level-headed, directs the English.

THE PRINCIPLES UNDERLYING THE SURVEY OF THE BOTTOM OF THE OCEAN FOR AN ALL-AMERICAN TRANS-PACIFIC CABLE TO THE PHILIPPINES AND THE ORIENT.

THE object of such a survey is so to develop the mountain systems of the bottom of the ocean that every large change of elevation will be disclosed and allowed for in the laying of the cable; and the problem therefore is to determine the intervals at which deep-sea soundings should be taken in order that important mountain systems may not escape detection and subsequent development.

The survey consists of two main parts: first, direct lines of soundings spaced at alternate intervals of ten and two miles passing between the successive landing stations at Honolulu, Midway, Guam, and Luzon, and also between Guam and Yokohama in Japan; and secondly, of sounding stations, twenty miles apart, at the turning points of a zigzag route passing back and forth to equal distances on each side of the direct lines of soundings.

The direct lines were run in passing to the westward from California to the Orient, and they give the general contour of the bottom. The zigzag lines were run in returning to the eastward for the purpose of giving breadth and configuration to the forms indicated as a result of the depths measured along the direct lines. This distribution of soundings was adopted as a result of a theoretical investigation giving the equation to the curve which, by revolution around a vertical axis, would generate the surface of an isolated submarine peak in which the crushing strength at any cross-section is equal to the combined weight of the formation above that section and of the superincumbent body of water.

Taking the origin of co-ordinates at the apex of the peak, and the axes of y and x to be vertical and horizontal respectively, the equation to the generating curve would be $y = \frac{\kappa}{\delta} + \frac{2\delta'}{\delta} \log x$, in which κ represents the coefficient of crushing strength of the materials composing the crust of the earth, δ the average density of these materials, and δ' the density of sea-water. The shape of the formation thus described resembles the form of the Eiffel Tower, but is much flatter in proportion to its height.

From the investigation of its properties it appears that the radius which a prominent orographic feature can have at the sea-bottom may be stated to be ten miles. An interval of ten miles coupled with an interval of two miles is the very longest that would be sufficient for general development, but these intervals are small enough to prove with certainty the existence or absence of any formation rising close to the surface of the deep sea.

Of all the possible ways in which a ten-mile interval could lie with reference to a submerged peak, that which would be most advantageous for a prompt discovery is the condition in which one end of the interval is at the bottom of the slope and the other near the apex, and that which would be least advantageous is the condition in which the interval is bisected by the position of the apex. In the latter case there would be nearly equal soundings at both ends, but the soundings at the ends of the adjacent two-mile intervals would immediately disclose the slopes.

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Vol. XII FEBRUARY, 1901 No. 2

CONTENTS

PAGE

AN AROUND-THE-WORLD AMERICAN EXPOSITION. BY HON. O. P. AUSTIN, CHIEF OF THE BUREAU OF STATISTICS . 49

THE CAUSES THAT LED UP TO THE SIEGE OF PEKIN. BY DR. W. A. P. MARTIN. ILLUSTRATED 53

SINGAN—THE PRESENT CAPITAL OF THE CHINESE EMPIRE. BY JAMES MASCARENE HUBBARD 63

THE MIDNIGHT SUN IN THE KLONDIKE. BY ALICE ROLLINS CRANE. ILLUSTRATED 66

JAPAN AND CHINA—SOME COMPARISONS. BY COMMANDER HARRIE WEBSTER, U. S. N. ILLUSTRATED 69

GEOGRAPHIC NOTES. ILLUSTRATED 77

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY . 88

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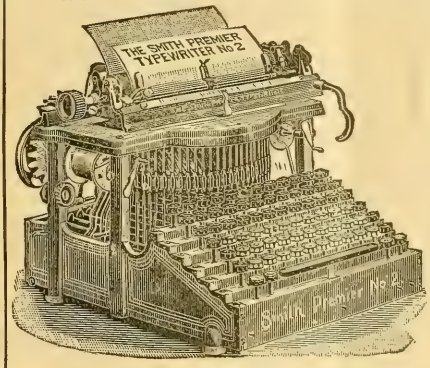

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VOL. XII, No. 2 WASHINGTON FEBRUARY, 1901

THE NATIONAL GEOGRAPHIC MAGAZINE

AN AROUND-THE-WORLD AMERICAN EXPOSITION.

BY HON. O. P. AUSTIN, CHIEF OF THE BUREAU OF STATISTICS

A FLOATING exposition, carrying samples of our merchandise around the world and putting our merchants in touch with those of all nations, seems to me a fitting American enterprise for the beginning of the new century. The nineteenth century has made the United States the greatest exporting nation of the world; why not begin the twentieth by showing to all the world what we have to sell and how we can sell it?

Exhibitions of the products of industry have proved beneficial to trade wherever undertaken, whether the ancient "fair" or the more modern "exposition." The traveling salesman with his sample cases has become a necessity of modern mercantile success; "commercial museums" exhibit to the dealers of one country the class of goods required in other lands, and the great European nations now send out "commercial missions" to inquire into and report upon the trade opportunities in distant countries.

But each of these methods has its limit of influence. The fair or exposition is dependent for its success upon the number of people it can attract to its doors, the traveling salesman represents but a single establishment or industry, the commercial museum conveys its information only to the seller and not to the buyer, and the commercial mission gathers information regarding the wants of distant people, but is unable to offer them samples of the goods which its own people have to meet those wants.

Why not combine the valuable features of these various aids to commerce in a single great enterprise—a "floating exposition," which shall carry samples of our merchandise to the very doors of the people whose trade we would foster, and by bringing the buyer and seller into personal contact, establish such mutual understanding of wants and conditions as to facilitate the interchange for which each is desirous?

FIELDS AWAITING AMERICAN ENTERPRISE.

The imports of Asia, Oceania, Africa, and the American countries south of the

United States amount to over two billion dollars every year. Nearly all of these importations *are of the very class of goods which we want to sell*—foodstuffs, textiles, mineral oils, machinery, and manufactures of all kinds; yet our sales to these grand divisions in the best year of our commerce, 1900, only amounted to about $200,000,000, or 10 per cent of their purchases. The annual imports of Asia and Oceania are over a billion dollars, those of Africa over four hundred millions, and those of the countries lying south of the United States about six hundred millions.

Most of the cities through which these two billion dollars' worth of goods are first distributed lie on the seacoast, and could be readily reached by a fleet of vessels loaded with samples of American products and manufactures. It is well known that the lack of practical knowledge as to the local trade requirements, such as methods of packing, kind of goods required, length of credit, etc., is the chief obstacle to the introduction of American goods in these countries, and that until this obstacle shall have been overcome we cannot expect to obtain the share in that trade to which our location and facilities of production and manufacture entitle us.

If a floating exposition were systematically organized, loading one vessel with exhibits of foodstuffs, another with textiles, another with agricultural implements and vehicles, another with manufactures of iron and steel, another with household requirements, and another with "Yankee notions," and sent from port to port and continent to continent, it should prove highly advantageous to our commercial relations with all of the countries visited.

Every manufacturer or exporter sending an exhibit would naturally send with it a capable representative, who could discuss with the local merchant the qualities of his goods and their fitness or unfitness for local markets.

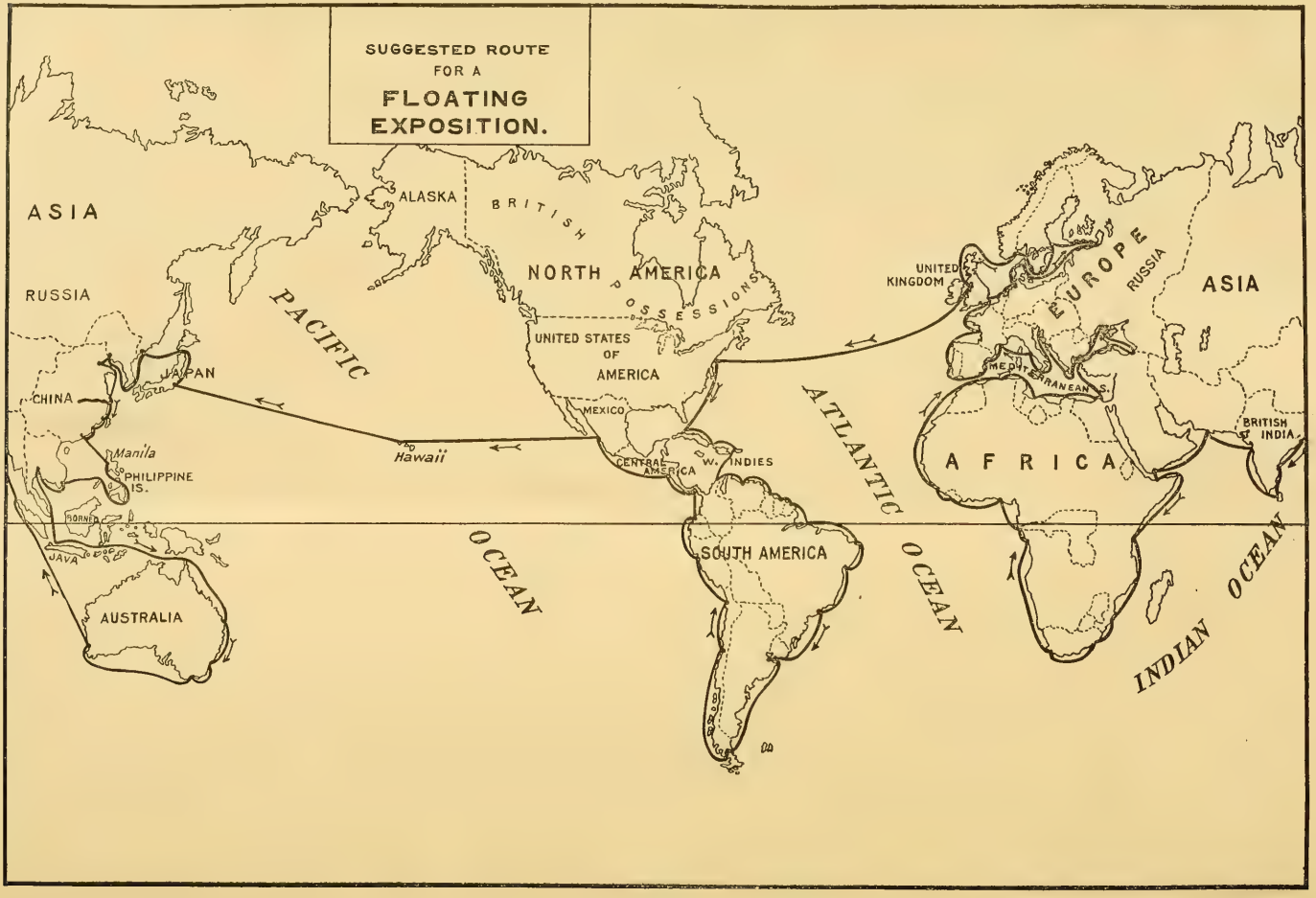
The coming of an exhibition of this character would attract at each port not only the business men of that city, but those of other commercial centers in the vicinity, and by this process the wholesale merchant of the United States would speak face to face with those of every country visited, and in these discussions would learn in a practical way the obstacles which now prevent a free interchange of commerce and the methods by which they can be overcome.

In addition to this, a corps of experts could gather samples of the goods now being sold in the countries visited, the prices obtained, the length of credit given, the banking and exchange facilities existing and required, and other facts which would prove valuable not only to those directly participating in the enterprise, but to all manufacturers and merchants of the United States, by their exhibition in commercial museums and by published reports.

THE FINANCING OF A FLOATING EXPOSITION.

The financing of an undertaking which contemplates sending a fleet of a half dozen vessels for a two years' voyage around the world appears at first sight a serious problem; but present conditions seem to be exceptionally favorable.

The producers, manufacturers, and merchants of the United States are greatly interested in the extension of markets for American goods, and the Bureau of Statistics is daily besieged with inquiries for information bearing upon this subject. The past three years have been exceptionally successful, and yet have shown the necessity of finding an increased outlet for the surplus which the American manufacturers show themselves capable of producing, and it seems not unreasonable to believe that they would look upon a reasonable expenditure for the extension of trade as money well invested. A great world's fair has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just been held at Paris, at which many Americans made exhibits, some parts of which would be suited to a floating exposition such as has been suggested. A great exposition, especially intended to apply to the people of Central and South America, is to be held at Buffalo this year, and its exhibits would in many cases prove a basis for an undertaking of this kind, while another exposition, especially relating to the West Indian trade, is to be held at Charleston. Thus, in the disposition to extend our commerce, in a prosperity which warrants new business ventures, and even in the partial preparation of exhibits, the circumstances appear to be especially favorable.

But there is still another condition which seems even more opportune and advantageous. The Government is the possessor of a considerable number of safe and seaworthy merchant vessels purchased as transports during the war with Spain, for many of which it will not have active use after the close of hostilities in the Philippines. If some of these vessels could be utilized for this work the problem, as to cost, would be greatly simplified.

Congress has always dealt liberally with expositions intended to improve our commerce, either at home or abroad, and it seems not unreasonable to suppose that if applied to by a proper business organization it might loan the necessary vessels for an enterprise of this kind. The appropriations of money made by Congress in behalf of expositions at home and abroad in the past 25 years amount to over $10,000,000, and in view of this it would appear probable that an appeal from a properly organized association of business men might meet with favorable consideration.

If there could be added to this fleet of five or six merchant vessels a naval vessel or two to convoy the fleet around the world and add to its attractiveness and dignity, the success of the enterprise, intelligently managed, should be assured. The chief expense which the ordinary exposition must undergo is the erection of buildings. The construction account of the World's Fair in 1893 was 70 per cent of the entire cost. With this expense obviated by the loan of vessels, if they could be so obtained, the cost of the undertaking would lie chiefly in the coal consumed in passing from port to port, and in the force of men necessary for the management of the vessels, and this might also be small in case Congress should accompany the loan of the vessels with a suitable detail from the military or naval force for their management.

Whether the expense should be borne solely by those participating in the exhibition in proportion to the space they might occupy, or be met in part by a small charge for admission could be determined by those guaranteeing the expense of the enterprise. In the ordinary exposition the chief receipts are from admissions, and these are drawn entirely from the population of the city where the exposition occurs and from those visiting that city for that purpose, while in the case of a floating exposition visiting great cities in various parts of the world the local population which could be appealed to would aggregate many millions.

THE ROUTE FOR A FLOATING EXPOSITION.

The route which a floating exposition might determine for itself would be bounded only by the limits of the great seas upon which it would float. Starting from the eastern coast of the United States, it would perhaps make its first stop at our new possession, Porto Rico, thence to Cuba and other of the West Indies, thence to the principal cities on the eastern coast of Central and South America, thence along the western coast of America, then to the Hawaiian Islands,

Japan, Korea, Asiatic Russia, the coast cities of China, the Philippines, Siam, the Dutch East Indies, Australia, the Malay Peninsula, India, Persia, Arabia, the eastern and then the western coast of Africa, then a tour of the Mediterranean and the cities of western Europe, and thence back to the place of origin, occupying two or perhaps three years, and meantime carrying the American flag and American enterprise to every part of the world. Why not an Around-the-world American Exposition to inaugurate the twentieth century?

THE CAUSES THAT LED UP TO THE SIEGE OF PEKIN

By Dr. W. A. P. Martin

I HAVE been asked to give some account of the siege in Pekin, together with the causes that led up to it, and its probable outcome. No proper view of the thrilling events which have there taken place can be given without first touching upon the *geographical situation*. Man is moulded by his environment, and it would not be difficult to show how the character of the Chinese—physical, moral, and intellectual—has been formed by the geography of their country.

Of England a well-known poet, after satirizing the villainous climate of his country, exclaims:

> "'Tis thus, with rigor for his good designed,
> She rears her favorite man of all mankind."

A Chinese philosopher would unquestionably adopt without objection every word of the English poet, and he would lay special emphasis on the phrase "her favorite man of all mankind." He reads in the ancient books of his own country a tradition that man was made not of dust, but of clay, the clay being of different colors. The Chinese were made first, and of yellow clay; hence they gave themselves the flattering designation of "Men of Gold." That title we find to have been a common one among the Tatars of the north. In the eleventh and twelfth centuries a large part of northern China was subject to a body of Tatars, who bore the tribal name of "Golden Horde." The present rulers of China, called Manchus, claim them for their remote ancestors, and continue to wear the same title of "Golden Horde"—in the Manchu language "*Aischin Gioro.*"

SEVEN CENTURIES OF FOREIGN RULE.

The relations of the Tatars to the Chinese from time immemorial have been very similar to those of the Shepherd Kings to the rich inhabitants of the Nile Valley. The Chinese depended upon agriculture, while the wandering nomads of the northern plains subsisted on their flocks and herds without settled homes. They were always ready to make incursions into the bordering provinces of China, and oftentimes succeeded in effecting the conquest of a portion or the whole of the Chinese Empire.

It is startling to discover that one or other of these Northern tribes, Mongol or Manchu, has exercised the mastery over China for seven hundred out of the

last fifteen hundred years; nor are the troubles caused by them limited to seven centuries, for the Great Wall, so huge as to form a geographical feature on the surface of the globe, attests a perennial conflict between Tatar and Chinese, for it was erected two hundred and forty years before the Christian era for the express purpose of keeping the Tatars out. That such a conflict should exist from generation to generation is no matter of surprise. Schiller tells us that it began not far from the Garden of Eden, and has been handed down from Cain and Abel to the present time. His version of the Bible story is that Abel's sheep trespassed on the cornfields of his brother Cain.

A Chinese historian says of the Great Wall: "It required so much labor for its construction that it was the ruin of one generation, but it was the salvation of all that followed." To me this appears to be an overestimate of its benefits; for while it has undoubtedly served the purpose of a barrier against small bodies of marauders, it has never sufficed to restrain great armies like those of Jenghis Khan. The Manchus, who for two hundred and fifty-six years have held the throne in Pekin, were not under the necessity of forcing their way across this international barrier, but had its gates thrown wide open for them by a Chinese general, Wu San Kwei. He invited their assistance to suppress a body of rebels who had taken possession of the capital, and to revenge the crimes committed by them, an errand very similar to that of the eight powers now in occupation of China. The rebels were easily put to flight, but when the general offered to pay off his Tatar allies and invited them to retire to the north of the Great Wall, they respectfully declined to do so.

An old fable tells us that an ass, in danger of being driven from his pasture grounds by a horned stag, invited a primitive man to mount on his back and drive away his enemy. When the stag was put to flight, he asked the man to dismount; but he was an ass to imagine that the man would comply with his wishes.

China finds herself in the same predicament today. Instead of the Manchu-Tatars, ranged curiously enough under eight banners, she finds herself completely under the power of the eight mightiest nations of the globe. They are in the saddle, with their bit in the ass's mouth, and though that noble beast, like that of the ancient prophet, speaks with human voice, and utters an energetic protest, it remains to be seen whether some of these eight nations will not persist in keeping their place in the saddle.

The fact that China is and has been under foreign domination for two centuries and a half is essential to the comprehension of that astounding movement which has so engrossed the attention of the world.

What motives, we are asked, could prove themselves so potent in their effect on all classes in that empire as to bring about combined action of high and low for the expulsion of foreigners? I answer that there are three motives which, taken in connection with the circumstances of the age, appear to me to be sufficient to account for the phenomenon. They are: first, political jealousy, second, religious antipathy, and last, but not least, industrial competition. These have operated in different proportions on different classes, while in some instances all three have combined to produce their effect on the mind of one class. The existence of political jealousy is inseparable from a foreign domination.

The Manchu dynasty, though it has produced many able rulers, has never been free from the influence of that kind of jealousy. The Manchus have always feared, since the dawn of commercial intercourse with the great nations of the west, that some of those nations

would endeavor to supplant them in the occupation of China. They have accordingly been suspicious of everything, whether commerce, missionary enterprise, or railways and mines, which tended to increase the prestige of foreigners. Some of these undertakings they have looked upon as a preëmption claim on their territory; others as a settled scheme for winning away the hearts of their people. You will naturally infer that they have never shown themselves, with one exception which I shall presently mention, very solicitous for the intellectual enlightenment of their Chinese subjects.

The old philosopher, Laotse, lays down as a maxim for easy government, in satire no doubt, that it is only necessary to fill the people's bellies and to empty their skulls. On this the present rulers of China—I mean the Empress Dowager and her clique—are acting in the suppression of schools, the interdiction of newspapers, and the attempted extirpation of Christian missions.

THE REFORMS ATTEMPTED BY EMPEROR KWANG SU.

The exception is a remarkable one. It is the young Emperor, Kwang Su, who is in no degree responsible for hostilities with foreign powers, but is rather to be regarded as the first victim on a long and sanguinary list. Nephew of the Empress Dowager, he was adopted by her at the age of three.

With a view to preparing him for his great destiny, he was provided with numerous instructors, two of whom were my own students. Their duty was to induct His Majesty into a knowledge of the English language, and, in order to be sure that the lessons which they set for him were correct, they always submitted them to me for approval. I shall not affirm, therefore, that I am entirely innocent of having exerted some influence to bias the mind of the young Emperor.

It is impossible that he should have studied English without becoming infected with progressive ideas. Still, the blame, or the honor, of having perverted the mind of the "illustrious successor" (as his name signifies) belongs to Kang Yu Wei more than to any one else. This patriotic scholar perceived the necessity of reforming the educational system of China in order to secure the permanent independence of his country. He gained the ear of the Emperor, and of that young man it is no little praise to say that he possessed the intellectual capacity to comprehend the ideas of the bold reformer and the strength of will to resolve on carrying them into effect.

He issued decree after decree, with startling rapidity, setting aside the effete system of essays and sonnets in civil service examinations, in favor of the sciences and practical arts of the modern world.

In order to prepare students for these new tests, a system of common schools was to be established, Taoist, Buddhist, and Confucian temples being placed at their disposal. Middle schools were to be established in all the districts, and colleges in the several provinces, with a new university in the capital for the graduates of provincial institutions and for the sons of the nobility.

Nor did His Majesty stop with educational reform. He diligently sought to prune away the dead branches of the tree in order to increase the quantity and improve the quality of its fruit. Sinecures in the Mandarinate were abolished, and new bureaus inaugurated, such as those for commerce, mining, and agriculture.

More than all, he resolved to confer on his people the priceless boon of free speech, ordaining that even junior officials should have the privilege of addressing the throne without let or hindrance.

This was the rock on which his noble scheme of reform was shattered. A young man, a doctor in the Han Lin, who was well known to me, through a

junior member in the Board of Rites, drew up a memorial proposing numerous changes in the administration of the government. His chiefs, all old men, and mostly Tatars, refused to transmit the document to the throne. The Emperor, on learning that they had dared to intervene between him and his officials, flew into a towering rage, stripped them of their official honors, and threatened to dismiss them from the public service.

Those old men, smarting under the disgrace, posted away to the country palace and threw themselves at the feet of the Empress Dowager, begging her to come out of her retirement and save the Empire from the hands of a young man who was driving the chariot of state so furiously that there was danger of his setting the world on fire. She had been regent twice before, but she had never retired altogether from the world of politics. With her neither card parties nor novels nor theatrical shows could compete in interest with the political chessboard; in all moves on that board her fingers had been more or less concerned. Eagerly did she embrace the invitation, and as with a bolt out of the blue heavens she struck down the impetuous youth, compelling him to sign a paper begging her to teach him how to govern. By way of justifying her action, she issued an edict, in which, among other things, she said that her subjects must not suppose that she was opposed to rational progress. It does not follow, she said, that we should stop eating because we have been choked. She meant to say that her adopted son had crammed his reforms down the throats of his people too fast for their digestion. She intended to administer them with judicious moderation, in such quantity and degree as would make them easier of assimilation.

Well had it been for her and her dynasty had she adhered to this principle; on the contrary, throwing herself into the hands of a reactionary party, instead of progress she entered upon an anti-foreign reaction in which a disastrous smash-up became inevitable. She began by canceling all the educational and other administrative reforms inaugurated by the young Emperor.

The only one of the institutions established by him which she permitted to remain was the new university. That institution she no doubt spared because it had been favored or, as one might say, founded by Li Hung Chang, who, by the way, though he still continues to be her faithful servant, has behind him a record of imperishable glory as the foremost patron of the new education in the Chinese Empire. It was he who recommended me for the presidency of the university, which I may describe as at present in a state of suspended animation, the Russians having seized on the buildings for soldiers' barracks and threatened to confiscate its funds, which were deposited in Russian banks.

THE GROWTH OF THE ANTI-FOREIGN FEELING IN CHINA.

A little before the *coup d'état* Germany had seized a seaport by way of reprisals for the murder of two of her missionaries in the south of Shantung. Russia demanded the cession of Port Arthur as an offset. England insisted on having Wei Hai Wei, on the opposite side of the gulf, in order to keep watch on the movements of her northern rival. France, in the far south, protested against being left out in the cold, for was she not as great a power as any of them? She demanded that the equilibrium of the political balance should be maintained by giving her the Bay of Kwang chau, not far from the borders of her Anamite Empire. The Empress, who by this time had become Regent for the third time, was irritated beyond endurance, and while she feigned to yield to these demands rather than to make war without due preparation, she made it known to her people that if any

other nation should come forward with similar demands, she would declare war with or without preparation. In the meantime she made extensive purchases of war material, and sought by every means to propagate anti-foreign feeling among her people as the best safeguard against foreign aggression.

Never had the anti-foreign feeling been at so low an ebb as during the short reign of the young Emperor. An awakening had shown itself among the Chinese people, which might be described as a shaking among the dry bones. Newspapers in the Chinese language had increased in two or three years from 17 to 76. The publication of the society for the diffusion of Christian and useful knowledge, consisting not of "Christian science," but science christianized, increased within the same time from $800 to $18,000. The whole people were penetrated with a desire for progress, and though they had been recently beaten in war by the Japanese, they proposed to imitate their victorious enemies and learn the best lessons of the west as the surest way of rehabilitation.

When the Marquis Ito visited China, a little more than two years ago, I complimented him on the influence which his country was exerting on China in consequence of being her nearest neighbor. I compared it to the tide, raised by the moon, as our nearest neighbor in the solar system ; but I took care not to hint that his country, like the moon, was shining by borrowed light. Yet it is true that the reforms which China and her young Emperor so much admired were borrowed at second hand from these United States.

Immediately on the occupation of Kiao chau the Germans proceeded to lay out railways in different directions across the province of Shantung, which they claimed as their sphere of influence, and which some of their newspapers, by way of anticipation, described as "German China." The natives were aroused, much more by these enterprises than by any abstract question of infringement of territorial rights. To them it appeared horrible that the spirits of their ancestors should be waked by the snorting of the iron horse, and that cemeteries should be desecrated by the passage of the iron road. They everywhere set upon the engineers and impeded the prosecution of their work. The most active in leading this opposition were the members of a secret society called "Boxers."

THE REVIVAL OF THE BOXERS.

That society is not a new one called into existence, as has been supposed, by the work of missions. On the contrary, it gave trouble more than a century ago to the Chinese Government, and in 1803 was formally placed upon the index of forbidden associations. Since then it has languished in obscurity until recent events called it into life, and until the favor shown it by the Empress Dowager transformed it into a great political party. The doctrine to which it owes its existence is not orthodox Confucianism, Buddhism, or Taoism, but a superstition based on hypnotism, mesmerism, or spiritualism, as it is variously called. Among its members are many whose nervous condition fits them for spiritualistic mediums, and through these the society gets oracles from the unseen world. They undergo a species of drill, which is intended to enable each member at will to go into the trance state. When in that condition they profess to be endowed with supernatural strength and rendered bullet-proof. These mysteries, so piquant to the curious at all times, were particularly attractive in view of possible hostilities with foreign nations. The organization spread like wildfire among the people of Shantung, and the Manchu governor, finding in these people an auxiliary force, supplied them with arms.

The Empress Dowager and Prince

Tuan encouraged them to come to the capital. In their devastating march they killed missionaries and laid waste Christian villages; nor did they abstain from many a village which was not Christian, but which excited their cupidity by the spoils which it offered. Reaching the vicinity of the capital, they tore up the railway leading to the west and burned down the stations near the city. Then it was, not till then, that the ministers in the capital awoke to the seriousness of the situation. Missionaries had been uttering their Cassandra warnings, but the ministers always turned for information to the Tsung Li Yamen, the official organ or Foreign Office of the Chinese Government. They were there told that these Boxers practiced an innocent kind of gymnastics, and if they did sometimes show themselves turbulent and disposed to quarrel with native Christians, it was not without cause; but the Empress Dowager intended shortly to issue a decree dismissing them to their homes. Such decrees were issued, accompanied by secret instructions not to regard them.

THE SIEGE.

The meaning of the destruction of the railway was not to be misunderstood; the ministers, without waiting for the consent of the Chinese Government, ordered a guard of marines to be sent up from the seacoast, and they arrived not a day too soon. The next day the railway to the east was also broken up, and had their arrival been delayed forty-eight hours no foreigner in Pekin would have lived to tell the tale. They were only 350 in number, but their mere presence for a time held our enemies in check, and they served eventually to make good the defense of the legations.

On June 11, a fortnight after their arrival, an attaché of the Japanese Legation was killed at the railway station by Boxers and Chinese soldiers combined. This may be regarded as introducing the first stage of the siege; for the next nine days the Boxers were specially prominent, setting fire not only to churches and mission houses, but burning up all the native storehouses which they suspected of containing foreign goods. Square miles of ground were left by them covered with the ruins of the richest business houses in Pekin. On June 19 a circular from the Foreign Office informed the foreign ministers that the admirals had demanded the surrender of the forts at the mouth of the river. This, said they, is an act of war. You must now quit the capital with all your people within four and twenty hours The ministers agreed to protest against the severity of this condition. The first to set out for the Foreign Office with this purpose in view was Baron von Ketteler, the German Minister. No sooner had he reached the great street than he was shot in the back by a man wearing the official costume of the Chinese Government, and fell dead. His interpreter was wounded, but succeeded in making his escape and giving the alarm.

The other ministers believed that a general massacre had begun, and with their people, who had already taken refuge under their several flags, they fled precipitately to the British legation, which, having been the residence of a high prince, covered a large space of ground and was surrounded by strong walls, forming a citadel capable of defense. It had accordingly been agreed upon as a place to make a stand in the last resort, and Sir Claude MacDonald not only generously welcomed his colleagues, but received all their people, whether civilian or missionary. The missionaries were accompanied by their converts, Catholic and Protestant, to the number of nearly two thousand. For the converts an asylum was secured in the grounds of a Mongol prince on the opposite side of a canal from the British legation. Professor James, the man chiefly instrumental in securing it, was

himself slain by the enemy in the afternoon of the same day. Had the enemy followed up their advantage they might, perhaps, in the midst of our first confusion, have overwhelmed all the legations; but they feared to come to close quarters.

Some of the outlying legations were destroyed by fire, but most of them were included within our line of defense. None of them, however, except the legation of Great Britain, was considered safe for the residence of a diplomatic family.

Within the gates of the British legation, which covered six or seven acres of ground and contained twenty or thirty different buildings, were congregated nearly one thousand foreigners, and from this time for eight weeks we were closely besieged, not by Boxers, but by the soldiers of the Chinese government. That very evening, at nightfall, they opened with a terrible fusillade, and this was renewed day after day, chiefly under cover of night; so that we came to speak of it rather contemptuously as a "serenade." It was not, however, altogether ineffective, for day by day some of our men were killed or wounded, and in the sorties, which were occasionally made to drive our assailants back or to silence their batteries, the casualties were always serious.

What we most dreaded was the firebrand, and when the ruthless enemy, with more than vandal ferocity, set fire to the library of the Imperial Academy, for the purpose of burning us out, we all had to assist in fighting the flames. Women and children, including the wives of ministers, passed buckets from hand to hand. A change of wind came to our aid, and the legation was saved. At first the enemy assailed us only with fire and small arms; gradually, however, they got guns of considerable calibre in position, and at all hours of the day attacked us with shell and round shot.

Mrs. Conger, wife of the minister, in whose family I was kindly received as a guest, had embraced the ideal philosophy of Bishop Berkeley, and looked on all this pyrotechny as a play of the imagination. I envied her the comforting delusion, for when I went out and picked up a six-pound round shot, I found it too heavy and solid to be resolved into a fancy. Whether owing to her philosophy or to her Christian faith, she is one of the most admirable women I ever knew; calm and unperturbed in the midst of danger, she realized the description which Pope gave 200 years ago of his ideal woman, as "Mistress of herself though China fall."

Mr. Conger, an old soldier, who fought through all the years of our civil war and marched with Sherman from Atlanta to the sea, met the trials and exigencies of this occasion with becoming fortitude and cool judgment. Diplomatist as well as soldier, he knows how to deal with the most serious questions that confront him as negotiator in this Chinese problem. His daughter, Miss Conger, had visited many water cures in quest of health. The fire cure to which she was now exposed proved to be the required remedy. On the first fire she threw herself weeping into her father's arms; the next day she listened to it calmly, and then from day to day she seemed to acquire new strength, until she came out of the siege restored to perfect health.

If I be asked how we spent our time, I answer, there was no frivolity and no idleness. Every man had his post of duty. Mine was to serve as inspector of passes at the legation gate for Chinese going back and forth between the legations within our lines. There it was my sad lot to see many fine young men go out full of life and hope, to come in wounded, maimed, and dying. We lost in all, killed and wounded, more than a third of our number.

If we are asked what we lived on, I answer, the coarsest of bread and the

poorest of meat. The meat was that of horses, varied by an occasional mule; even that was so reduced in quantity that only three ounces per diem was allowed for each individual. Milk was a luxury; even condensed milk beyond our reach, and no fewer than six or seven infant children perished for want of it.

While the men fought or mounted guard the women made sand bags from day to day to the number of many thousands for the strengthening of our fortifications, and by their calm demeanor and hopeful words they strengthened the arms of their brave defenders.

On one occasion it was deemed necessary to make a desperate effort to regain possession of a portion of the city wall which dominated these legations. A company of some 60 men—American, British, and Russian—was formed under the lead of Captain Myers, of the U. S. Marines. When ready to make the attack, and hoping to take the enemy by surprise, he made a short speech.

"My men," said he, "within yonder legation there are 300 women and children whose lives depend upon our success. If we fail, they perish and we perish with them; so when I say 'GO,' then go."

The Americans and English were thrilled by his words, and the Russians understood his gestures. All felt that it was a forlorn hope, and all were ready to lay down their lives to insure success.

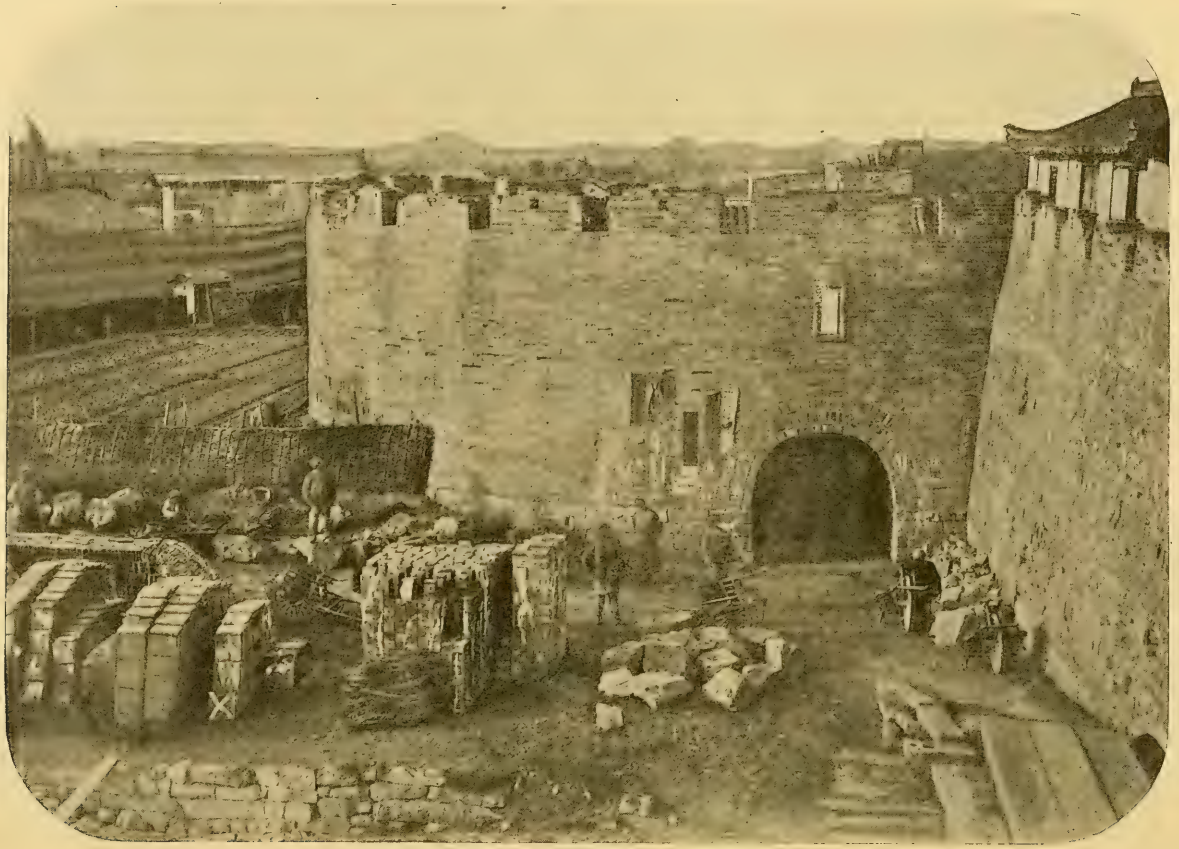
The movement proved successful, and that portion of the wall remained in the possession of our men until our rescuers entered by the water-gate beneath it.

THE RELIEF.

When the siege began we expected relief in a few days; but when Seymour's column was driven back we tried to wait with patience for the coming of the grand army under the eight banners. Yet so closely were we shut up that we had almost no information as to its movements, and our souls were sickened by hope deferred. At length, when our rations had run almost to the lowest ebb, when we had horse meat for only two days more and bread for no more than a fortnight, so that starvation actually stared us in the face, one night, on August 14, a sentry rushed into Mr. Conger's room, where I also was trying to sleep, and cried out, "They are coming; they are coming; the army of relief! I hear their guns!" The minister and I were soon in the open air; we did not wait to put on our clothes, for we had never taken them off. We heard the machine guns playing on the outer wall, and never did music sound so sweet. It was like the bagpipes of Havelock's Highlanders to the ears of the besieged at Lucknow. The ladies were wakened, and soon men and women poured out from all the buildings and listened with irrepressible excitement to the music of the guns. Women threw themselves on each other's necks and wept, while men grasped hands with feelings too deep for utterance.

The next morning the great gates of the legation were thrown open, and in rode a company of Indian cavalry. They were, I thought, and I have no doubt every one of our besieged garrison thought the same, the finest men I had ever looked upon.

The siege was ended. The rest of the army entered by the great front gate of the city, the key of which had been captured from the flying enemy by Captain Squires, of our legation, who is one of the heroes of the siege. The next day we all joined in singing a Te Deum in the tennis court of the legation, and Dr. Smith in a short address pointed out ten circumstances in each of which the finger of God was visible in our deliverance. He might have extended them a hundred. After thanking God, it only remains to thank our noble President for having dispatched the army and navy to our succor without waiting



Old Gate in City of Pekin.

From Commander Harrie Webster's collection of Chinese pictures.

Suchau Creek at Shanghai.

From Commander Harrie Webster's collection of Chinese pictures.

to call an extra session of Congress. I feel proud of my country for the record she has established on this occasion, not only taking her place among the Great Powers who have interests as wide as the world, but showing that her arms are long enough to protect and rescue her people in all parts of the globe.

INDEMNITY FOR NATIVE CHRISTIANS.

The curtain has not yet fallen on the last scene of this tremendous drama. The Empress and her court fled the city almost at the moment when our troops entered it, and she has taken refuge at an old capital in one of the northwestern provinces. Whether the government will be reëstablished at Pekin is highly problematical. For my own part, I think the restoration of the young Emperor, who might carry out his progressive measures under the supervision of the Great Powers, offers the best solution. The integrity of the empire would then be maintained and possible conflicts between European claimants averted.

China must, of course, pay a heavy war indemnity. It is understood that not only the foreign nations, but individual foreigners, will be indemnified ; but no assurance is given that any compensation will be made to native Christians, whose houses have been burned and whose relations have been slaughtered. Diplomatists and military men have joined in acknowledging that but for the bone and muscle supplied by those native Christians, the defense of the legations would have been impossible. Though they performed the humble office of navvies in building barricades, digging trenches, and countermining against the enemy, their services were indispensable to the common safety.

I cannot believe that any Christian country will consent to the gross injustice which is involved in excluding them from the provisions of the indemnity clause.

The greatest enemy to the orderly and profitable intercourse of nations is heathen darkness. No restriction, therefore, should in any way be placed on the operations of missionary bodies who seek to dispel that darkness, and to diffuse the light of science as well as religion. Without these our railway and mining enterprises will be insecure, and we can have no assurance that that monster, the dragon, who has now been cast down before the Soldiers of the Cross, will not again raise his head and bring about another catastrophe similar to that which has so lately horrified the world.

SINGAN—THE PRESENT CAPITAL OF THE CHINESE EMPIRE

SINGAN owes to its position the distinction of being for at least the fifth time the capital of the Chinese Empire. The mountain valley in which it is situated is marked out by nature to be the center of the national life. Through it flows the Weiho, along whose banks lies the great road which leads from northern China into Central Asia. Near the city the river is joined by a northern tributary, the Kingho, and then, running east, it breaks through the mountains by the "gate of Tung-kuan," where there is a famous fortress of the same name. This gives an easy access to the eastern and coast provinces. In

this valley also are the only practicable passes, two in number, over the Tsin-ling Mountains, which form the barrier between northern and central China.

In consequence of these unrivaled advantages, trade routes from every direction have converged here from time immemorial and made it a place of great commercial importance, famed for the enterprise and wealth of its merchants. It is the trade center from whence the silk of Chekiang, the tea of Honan and Hupeh, and the silk and sugar of Szechuan are distributed to the markets of Mongolia, Turkestan, and Russia in exchange for rhubarb, musk, medicinal plants, opium, wool, and furs.

The valley of the Weiho is one of the granaries of China, and the city itself is in the midst of a vast wheat field. The traveler approaching from the east passes through a country "like one continued splendid park, with knolls and lawns and winding paths." The road is a "fine highway—for China, with a ditch on either side, rows of willow trees here and there, and substantial stone bridges and culverts over the little streams which cross it." The city is surrounded by a high wall, said to be forty miles in circumference, with four huge gates flanked by magnificent towers. The principal streets are well paved, and full of good shops, together with palaces, imposing temples, and government buildings.

One of the few European travelers who have visited Singan, the Rev. A. Williamson, says that it appeared to be "densely filled with houses, having little or no vacant ground or gardens as in other cities." At that time, 1866, it was the residence of a Roman Catholic bishop, who claimed that there were about 20,000 Christians in his diocese. Its population is variously estimated from five hundred thousand to a million souls. Michaelis, who visited it in 1879, writes of the courteous treatment which he received wherever he went from the crowds which thronged the streets.

Though Singan contains no buildings of great antiquity—a mosque built in the ninth century is probably the oldest structure—the famous Pei-lin, or "Forest of Tablets," is the most valuable archæological and historical museum or library in China. Here are tablets which chronicle events of five dynasties from B. C. 100. Others are apparently mere specimens of elegant calligraphy and drawings of well-known mountains and historical scenes. There are also emblematical animals, sacred birds, and likenesses of their great men. Among these is a full-sized portrait of Confucius and several of his disciples. The most celebrated of all are the Thirteen Classics, cut in stone, dating from the Han dynasty, far anterior to those in Pekin, now so famous. The most interesting monument of past times to the Occidental visitor, however, is the Nestorian tablet, commemorating the introduction of Christianity into China. On it is an inscription in Syriac and Chinese characters giving first a vague abstract of Christian doctrine, and then follows this passage:

"In the time of the accomplished Emperor Taitsung, the illustrious and magnificent founder of the dynasty, among the enlightened and holy men who arrived was the most virtuous Olopun, from the country of Syria. Observing the azure clouds, he bore the true sacred books; beholding the direction of the winds, he braved difficulties and dangers. In the year A D. 635 he arrived at Chang-an; the Emperor sent his Prime Minister, Duke Fang Hiuen-ling, who, carrying the official staff to the west border, conducted his guest into the interior. The sacred books were translated in the imperial library, the sovereign investigated the subject in his private apartments; when, becoming deeply impressed with the rectitude and truth of the religion, he gave special orders for its dissemination."

The imperial proclamation, which is

given, commends the principles of this new religion and closes with these commands: "Let it be published throughout the Empire, and let the proper authority build a Syrian church in the capital in the I-ning Way, which shall be governed by twenty-one priests." Then comes a summary of prominent events connected with the "Illustrious Religion" and a recapitulation of them in an ode in octosyllabic verse. At the end is the date of its erection, A. D. 781, "in the second year of Kiengchung, of the Tang dynasty, on the 7th day of the 1st month, being Sunday," and the names, possibly of donors, of sixty-seven priests in Syriac characters and sixty-one in Chinese.

The tablet, which is said to be the oldest Christian inscription yet found in Asia, was discovered in 1625 and is now in a brick inclosure outside the city walls amid heaps of stones, bricks, and rubbish. Its preservation is due, strangely, to the care of a Chinese, as an inscription on the edge of the stone shows. It is to the effect that, in 1859, a man named Han-tai-wha, from Wu-lin, had come to visit it, and had found the characters and ornamentation perfect, and that he had rebuilt the brick covering in which it stood. The last words are: "Alas! that my friend Woo-tze-mi was not with me, that he also might have seen it. On this account I am very sorry."

The tablet is, or was—for it may have been destroyed in the fanatical hatred of all that is foreign which has taken possession of the people—a striking witness of the power which the Christian faith had over the Chinese a thousand years ago and in the nineteenth century, for this restorer and his friend must have been native Christians.

It is remarkable that Singan is identified with the greatest men whom China has produced and with the most glorious epochs of Chinese history. This is especially true of the time, B. C. 1122, when it was first made the capital of the Middle Kingdom by Wu-wang, the founder of the Chau dynasty.

"No period of ancient Chinese history," says Dr. Wells Williams, "is more celebrated among the people than that of the founding of this dynasty, because of the high character of its leading men, who were regarded by Copernicus as the impersonation of everything wise and noble." The Emperor, with his father and brother, ranked "among the most distinguished men of antiquity for their erudition, integrity, patriotism, and inventions." It was then known, and for many centuries afterwards, as Changan, or "Perpetual Peace"—a name still preserved as that of one of the quarters of the modern city. In B. C. 246 one of the greatest rulers China ever had chose it for his residence. This was Chi Hwangti, the "first universal emperor." Though a boy of but thirteen years of age when he ascended the throne, he speedily showed great capacity for governing and as a warrior. To improve the communication between his capital and the provinces he constructed magnificent roads and bridges, some of which remain to the present day. This work was carried on by his successor, who is said to have spanned the valleys of the neighboring mountains with suspension or "flying" bridges, thus anticipating western science by twenty centuries.

But the "universal emperor's" fame as conqueror of the Tatars and the builder of these public works and the Great Wall is eclipsed by his unwise efforts to secure certain reforms. He had become convinced that the fanatical worship of the past which characterized the teaching of the scholars was fatal to progress and full of danger to the state. He determined therefore to break once and for all with the past, and ordered that all books having reference to the past history of the Empire should be burned. This decree, which was almost universally obeyed, and with considerable loss of life, apparently but strength-

ened the evil against which he was striving. It is a significant commentary on his act that in the Chinese schools of today history later than the accession of the present dynasty, 1643, is not taught. The literati, it may be added, disregarding the true reason of his decree, attribute it simply to his vanity—the hope "that he might by this means be regarded by posterity as the first emperor of the Chinese race."

Nearly nine hundred years later Singan is again made the capital by Taitsung, who so cordially welcomed the Nestorian priest. He was "famed alike for his wisdom and nobleness, his conquests and good government, his temperance, cultivated tastes, and patronage of literary men. He established schools, and instituted the system of examinations, and ordered a complete and accurate edition of all the classics to be published under the supervision of the most learned men in the Empire." It is probably not too much to say that during his reign this now almost unknown city was the center of the most advanced civilization that existed at that time on the earth. Soon after his death the throne was usurped for twenty-one years by a woman, who bears a remarkable resemblance in some respects to the Dowager Empress who now exercises supreme power in this ancient city.

In our own times Singan is noted for the brave and successful defense of its inhabitants against the Mohammedan rebels in 1865, although there were some 50,000 of their coreligionists within the walls. These were compelled to abjure their faith on pain of death, and to put up in their mosques inscriptions to the emperor and to Confucius.

The situation of the city, over six hundred miles from the coast, and its impregnability to any force that it is likely could be brought against it will probably make it seem for the interest of the present rulers of China that it should be once more the permanent capital of the Empire. From its history in the past we may hope that this will be the presage of an era brighter for the Chinese than that which is apparently closing.

JAMES MASCARENE HUBBARD.

THE MIDNIGHT SUN IN THE KLONDIKE

AFTER the long, dark, dreary days of winter, summer approaches with marvelous rapidity. Before the snow has all disappeared the days are twenty-four hours long, and there is no need for candles or lamps during the months of June and July and part of May.

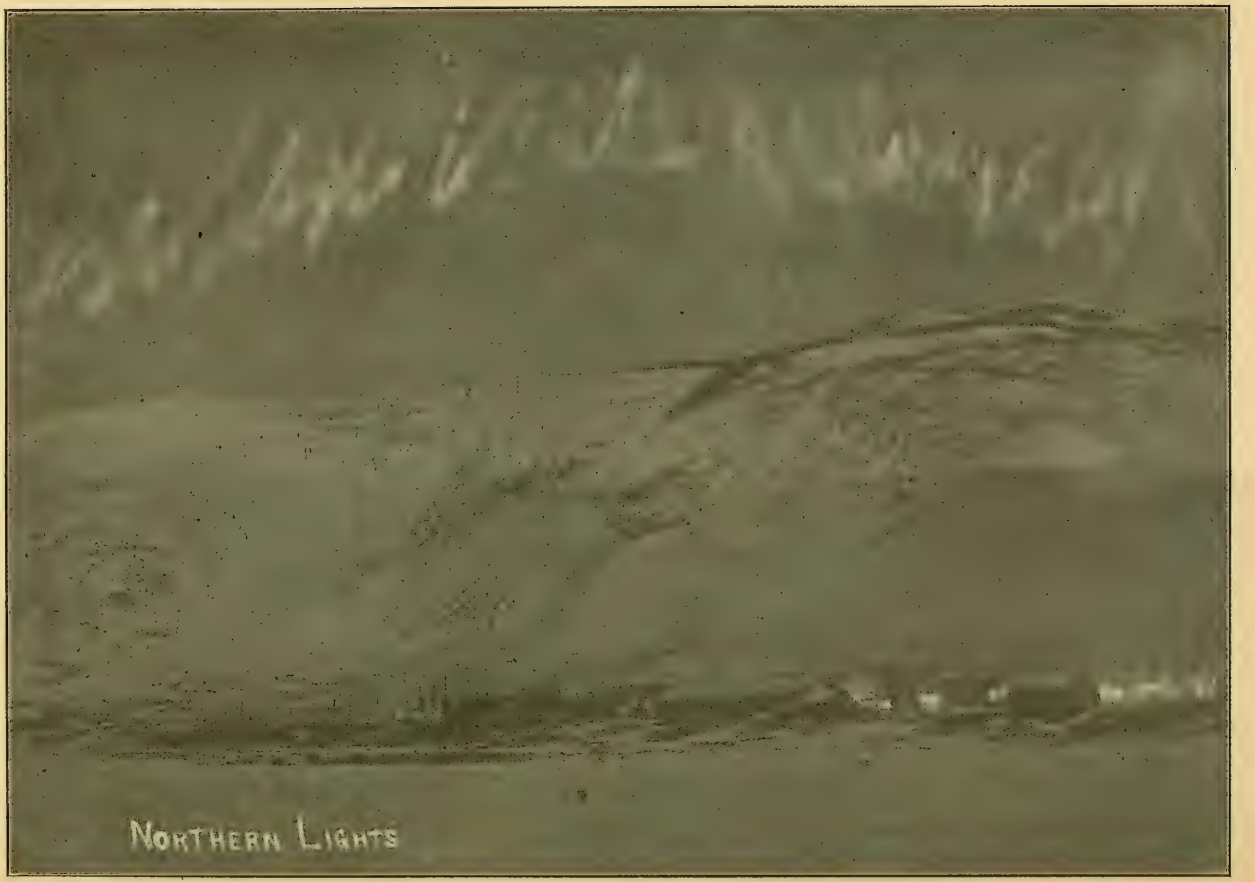
About the middle of June photographs can be taken quite distinctly at midnight. Many, fond of climbing, like to mount the highest domes and watch the sun at midnight. If the night is clear, they are well repaid for their climb. There is a strange, weird look about the sun at such a time—a sort of tired look, as if he would like to disappear below the horizon for a little rest, and then mount in the morning like a giant refreshed.

He marches steadily on, and just as we think he will descend below the skyline, he gradually turns eastward and heavenward and soon begins to flood the lesser hills with light and warmth. We then turn homeward, for if caught too far from home when the sun has regained height and power, we shall feel in no mood for walking, as the summer days in the Klondike are fiercely hot and wearying.

What a contrast there is between the dark, sunless, icy days of winter and the bright, glaring, almost unbearably hot days of summer!

ALICE ROLLINS CRANE.

MIDNIGHT SUN, DAWSON, JUNE, 1900


NORTHERN LIGHTS

THE NORTHERN LIGHTS

AFTER an intensely dry, cold day I have watched for a display of the Northern Lights and have been rewarded by seeing one of the most beautiful displays nature can afford.

At its first appearance the Aurora is hardly noticeable, but in a few minutes the bright, luminous cloudlet enlarges and rapidly rushes from east to west and from west to east, across the northern sky.

Sometimes the phenomenon will dip down almost to the earth and envelop in its bright folds tree tops but a short distance away. Then it puts one in mind of a rainbow reaching the earth and allowing one to look through its iridescent bars to the hazy landscape beyond.

It shines steadily for a while, then suddenly, as though a gentle breeze were toying with its beauty, the lambent flame begins to quiver, then becomes strongly agitated, and at last rushes along from side to side, like the opening and shutting of a silvery fan or the wings of a swan when he is pluming himself on the bank of a stream.

I have never noticed the rainbow-like colors depicted in some paintings. The light was more like steam rising at night, brilliantly illuminated by a beam of electric light.

Then at times it would gradually fade till it resembled phosphorescent waves barring the progress of a ship.

At such times visitors coming into our cabin from the dry, crisp air would pull off their skin mitts amid a cackling of electric sparks; our blankets and fur coats, if rubbed, would give out a succession of sparks, and our hair would try to stand away from the head like quills on a porcupine, and if brushed would snap and sparkle very distinctly, all the time clinging to the brush or to anything placed above the head. I have walked to the stove and with my knuckle drawn a spark from the metal top half an inch long.

ALICE ROLLINS CRANE.

JAPAN AND CHINA—SOME COMPARISONS

By Commander Harrie Webster, U. S. N.

IN many respects the people of China and Japan are not comparable, because their ethical, racial, and ethnological differences are so marked as to make comparison misleading.

But the wider and more continued the field of observation, the smaller become the differences remarked. The observant traveler will assert that the Chinaman's eyes are as horizontal in their major axis as are ours. The assertion is quite correct! The slanting effect is caused by the configuration of the eyebrow, and to some extent by the tendency of the Chinaman to keep the eyes partly closed, due to the absence of a projecting visor or peak in their head coverings. As a matter of fact, the eye sockets in the Chinese skull are shaped and arranged practically as are those in the Caucasian. Examples in support of the position here assumed might be multiplied, but this, the most striking, seems sufficient to substantiate the contention.

The Japanese hold the position of

being the most progressive people of which history gives any account, and the most singular fact in connection with this progress is that its genesis was spontaneous, no outside influence or pressure being brought to bear to effect the tremendous changes in the governmental system and methods.

The change was a true evolution, and was carried out with practical unanimity by governors and governed alike.

A point seldom or never noted by travelers or writers on ethnological subjects is the odor possessed by the various tribes of men, and for want of a better phrase I will call it the "race smell."

The race smells of several members of the human family are distinct enough to influence not only their neighbors, but the domesticated animals of other races. Witness the race smell of the North American Indian, sufficiently marked to be disagreeable to white nostrils, and to be a source of alarm to our horses and dogs.

From observation I am led to conclude that the accidents of clothing, habits, and environments are operative upon the race smell only as modifiers, increasing or decreasing that smell according to circumstances. Witness the strong race smell of the Negro, persisting in spite of the environments of ages of civilization.

The application of the foregoing to the question under discussion lies in the fact that the race smell of the Japanese is so slight as to be scarcely recognizable, while the Chinaman has the race smell so well developed as to be distinctly noticeable in any considerable assemblage. Its marked feature is that it produces a distinct tingling in the end of the nose of the European, and once experienced will never afterward be mistaken. The Chinaman says we smell like sheep, and our race smell is as disagreeable to him as his is to us, another and novel application of the old adage of "*de gustibus non est disputandum.*"

In Japan one looks in vain for examples of bygone architectural ability, for the remains of bridges or monuments, roads or temples, and the idea impresses itself upon the mind of the observer that Japan is a new country, that its past is but of yesterday in comparison with China, Korea, or India; but this impression is speedily forgotten when an examination of the literature, laws, language, and art discloses the fact that Japan counts her history by thousands of years, and that her literature contains examples written before the day of the Roman Empire. We are shown pieces of bronze-work two thousand years old. We look upon an emperor who is the one hundred and twenty-first of an unbroken dynasty which was founded 660 B. C. !

We are impressed with the national virility which can, after so many centuries of existence, voluntarily modify its system of government into sympathy with the ideas of today, and follow up that tremendous change by adopting the best the modern world has to offer in every branch of human thought, and adapting itself as a people to the use of all those ideas which form the difference between the universe of yesterday and the world of today. Whether their attempts are successful is not pertinent to the subject, for, looking at the intent of the Japanese nation as exploited by her leading men, we see that, modified, it is true, by the environments of their traditions and history, Japan is well in the forefront of the family of modern nations.

In China, on the other hand, but little of interest presents itself which is not a monument of a long-departed glory. Splendid bridges, huge gateways fashioned in stone, canals, bronzes, remain unequaled elsewhere for beauty and fitness of design, a literature stretching back beyond the limits of any written history outside of this huge empire. China is of the past; her dreams are all reminiscent; her efforts are expended in

preserving what has been created rather than in producing aught of credit for the present.

It must be conceded that the signs of past ability in nearly every direction of human thought and labor compare favorably with the remains of any nation; and with that China is satisfied. Progress and the adaptation of the mental powers to the requirements of modern needs find no favor with the average Chinaman; and perhaps it is in some sense fortunate for our *amour propre* that it is so, for if the tremendous mental acumen and brain subtlety possessed by this singular and very gifted race were earnestly applied to the problems of modern life it is extremely doubtful if the intellectual superiority of the Caucasian would be so much in evidence as appears at present.

In real mental power, in the ability to grasp the most abstruse conceptions, I doubt if there can be found the equal of the better class of Chinese scholar.

The native of Japan and his yellow brother of China have, however, a marked characteristic in common, and so pervading is this trait and so important as an indication of remote common origin that I think sufficient stress has not been laid upon it by ethnologists and observers. I refer to the persistence and infinite patience shown in carrying out the greatest works without the aid of machinery—"infinite repetition of individual effort" in all branches of labor. In the minds of the people of these two nations time is not an element entering into calculation, and the cost of a piece of work is apparently computed with sole reference to the quantity of labor expended without taking into account the time as such.

The native of Japan is willing to admit that he is not the aboriginal—that is, that he displaced a preceding race—and in doing so either absorbed or destroyed that race.

Not so the proud and haughty subject of the Son of Heaven. He aspires to be first in everything, and in consequence has convinced himself that his race is the only one ever inhabiting the land where reigns the Celestial Empire. The Chinaman contends that he is aboriginal, actually to the manor born, and that China belongs to the Chinese because no other race ever occupied the soil.

It must be admitted that the argument is on the side of the Chinaman, for no history or literature contains the slightest mention of his predecessors. The written records of Japan and China are daily becoming more accessible to the western scholar, and, notwithstanding the disbelief in their accuracy and value, these ancient documents will probably give as much real history as other ancient records of nations better known to the scholastic world.

In the matter of domestic architecture Japan and China are at the antipodes. Throughout the Mikado's Empire the people inhabit structures of wooden framework surrounded by paper walls, so that a fierce wind will often blow the sides of a house in on one side and out on the other. The roofs of these slightly built houses are, however, of strong and heavy timbers, bearing a covering of earthen tiles or thick thatching. The frequent and widespread conflagrations in Japanese cities are not regarded as inflictions to be regretted; on the contrary, the huge fires which sometimes consume hundreds of dwellings are looked upon as blessings, their cleansing and sanitary effects more than offsetting the material losses.

The almost painful cleanliness in a Japanese house is a never-ending subject of comment by foreigners, and the heartiness with which the maids of all work rub and scrub and deluge with water every available bit of wood-work is a real revelation of the innate cleanliness of the "little brown man" and all his belongings. The result of all this persistent cleaning is that throughout the

Empire not an evil smell nor a filthy spot can be found. The vile odors caused by the collection and transportation of human excreta for fertilizer are forcible proof, though not apparent at first, of the instinctive spirit of cleanliness throughout Japan.

With the Chinaman all this is almost exactly reversed. A Chinese house is built in the most substantial manner—of stone or tiles. It is, in fact, according to a trite proverb, intended to last forever, and its condition, while neat, is not especially clean. The condition of the streets in a Chinese city literally staggers belief. The villainous smells rising from the nameless filth of a street in a populous city cannot be adequately described.

Although in domestic architecture these two peoples are so diametrically different, their ecclesiastical constructions are strikingly alike. A Buddhist temple of Japan might be set up in China and little difference would be noted in the building itself, but in its ornamentation, exterior and interior, especially in the images and figures, a marked dissimilarity is observable. In the Chinese temple there is a certain grotesqueness and unreality which is lacking in the Japanese figures. Not only is this true of the modeling and action, but in coloring the difference between the artistic sense of the two nations is very striking. The acute observer can readily assign to a colored figure its correct origin by these characteristics of the two nations whose ecclesiastical art has a common genesis. It is proper to note, however, that in neither example do these artists of the Far East approach in any degree the western standards.

The charitable organizations among the dwellers in the Celestial Empire are the wonder of the western observer. The altruism born of countless centuries of civilization finds expression in charity as comprehensive in its methods as it is universal in its expression. In China there is scarcely a type of misery, of poverty, of sickness, of distress, without its corresponding charity among the more fortunate classes. In fact, charitable organizations are not confined to the rich, but among the poor themselves societies flourish and guilds exist for the amelioration of the condition of those occupying the social strata down to the very bottom in the scale of misery.

The indigent, the sick, the maimed, the friendless, the blind, the beggar, the laborer, the young, the old, the living, and the dead—all in need of food, clothing, medicines, shelter, assistance, burial—are the objects of definite charitable societies, whose members, while constantly on the lookout for their less fortunate neighbors, seldom or never apply for assistance in their good work from the few non-members of some guild or society. Not only are the distressed and sick assisted, but the coolie, the laborer on the bund, the bearer of burdens, is the object of care and charity, and close beside the streets, crowded with porters, "pole coolies," and wheelbarrow carriers, huge earthenware jars of tea are set out, furnished with cups, for the use of those who have no season of rest save on the completion of the task in hand. And it is a pleasant sight to see the smile with which a well-dressed Chinaman will hand a cup of tea to his ragged, sweating brother, burdened almost to exhaustion and parched with thirst. In these charities, as in all other things, the Chinaman is practical, and fine-spun theories give way to the actualities of every-day life.

In practical philanthropy the Japanese and the Chinaman are widely separated, for notwithstanding the fact that charitable organizations exist and flourish among the subjects of the Mikado, they are neither so numerous nor so far-reaching as with the subjects of the Son of Heaven. The Japanese altruism deals rather with theory than with facts; so that the whole difference may be put

in a nutshell by the phrase, "The Chinaman does much and says little; the Japanese says much and does little." In both nations, however, the poor and crippled possess special privileges never interfered with by their more fortunate neighbors. It is said that robbery from a beggar is an unknown crime in either nation.

The "Potter's Field" has no existence in China. The guilds for the burial of the dead see to it that no corpse is unprovided with a coffin and a definite burial place. During my stay in Shanghai a terrible accident on the Woosung Bar resulted in the wreck of the steamer *On Wo* and the drowning of several hundreds of coolies embarked for passage up the Yangtze. These men were of the very poorest class of laborers, and as their bodies were brought to the banks few were identified by friends or relatives for burial. Under the personal supervision, however, of a local mandarin, the member of a funeral society, every unclaimed body was placed in a decent coffin and properly buried after the Chinese style!

Among the Japanese the practice of cremation has long been in vogue, and this method of caring for the dead is adopted for the safe disposition of the remains of those dying without friends or money. In fact, on account of the ravages made by cholera at intervals, the crematorium has become an adjunct to nearly all the cemeteries in the Empire. Among both peoples, however, public mendicancy is a recognized institution, and the street beggar is sure of alms; so it must strike the thoughtful mind that our western civilization does not possess a monopoly in charity, either organized or individual, and that altruism is the property of the human family rather than of any particular branch of that family. These far eastern eleemosynary institutions will surely bear comparison with any mentioned in history.

In the eyes of the Chinaman the soldier is a man defiled by blood, and in the social scale the fighter finds a place in popular estimation with the butcher, the tanner, and the preparer of the dead for burial. It follows from this that the dependence of the Empire for its defense is now and has been for many centuries the arts of the diplomat rather than the generalship of the soldier. Notwithstanding this condition, however, the Chinese have in the course of their long national history done some good fighting on various occasions and for various reasons, and it is not putting the case too strongly to assert that in the future the Chinese will give a good account of themselves on the field of battle in defense of their country, their Emperor, and of their national existence.

Passing now to the Japanese side, we see a nation so filled with patriotism, so earnest in defense of national honor, and so proud of their country, that from the earliest times they have been a fighting people. Altruism, as applied to a common enemy, has found no place in Japanese ethics, and today, having adopted the so-called western methods of warfare afloat and ashore, Dai Nippon is competent and willing to hold its own in any attack from any direction. The fighting man—the soldier—of Japan, in public estimation, stands head and shoulders above his fellows, and the dearest wish of the father of boys is that his sons may be accepted for the service of the Mikado. In all the wars of Japan the government has suffered a true embarrassment of riches in the matter of personnel, every man of the Empire tendering his services in the field for the common good.

Passing from the general to the particular, from the nation to the individual, it is interesting to note a few of the more common or ordinary differences in the two nations. The Chinaman, in a general way, is a fat and robust man; he shows the influence of prosperity by

an increase in girth; his walk becomes stately; his expression benignant and kindly. He enjoys rich food and a good deal of it. The Chinaman of wealth and position clothes himself literally in purple and fine linen, and shows in every action an appreciation of the good things of this life.

On the other hand, the Japanese, rich or poor, lives sparingly, eats plain food, and even with this limitation is genuinely abstemious in quantity. He is content with comfort without luxury, and from end to end of the Mikado's Empire it is difficult to find a fat man or woman.

The question is often asked why the punishments inflicted in these eastern countries are so barbarous and cruel.

With the Chinese, as with us, in theory, the two points kept in view in the application of law to the criminal are: first, to make the punishment fit the crime; second, to make a deterrent example for those who, without the fear of consequences, would tend to the commission of crime. It must be acknowledged that on both these points the Chinese methods are typical, and if the criticism is made that many punishments are inflicted out of all proportion to the offense, it is wise to remember episodes in our criminal history when witches were hung, burned, and done to death in various cruel ways. We can remember when the theft of a loaf of bread in England sent the victim across seas a transport for life. Even in our own enlightened land it has frequently happened that the theft of a horse meant death to the culprit. So it may be wise not to criticise the Chinaman too harshly for trying to punish the criminal and instill terror in the evil-doer at the same time.

In all literature on China and Japan the subject of morality, and especially what may be called sexual morality, occupies a due proportion of space, and its discussion is of great interest, but a clear understanding of the subject requires a more careful study of morality in the abstract than most writers can bestow.

In this, as in many other important questions, much depends upon the point of view, and it is very difficult indeed to make a correct and comprehensible presentation of the point of view of the Asiatic upon such a vital subject as sexual morality. Generalization based upon incomplete knowledge is misleading and dangerous, and in connection with this question rests the real status of woman in China and Japan, a subject much too intricate to be presented in the pages of this Magazine.

Perhaps in no single direction do the Chinese differ more from their Japanese neighbors than in the official position of woman. In China a man's wife is of little moment in the public or, more properly, the outdoor life of her husband. She seldom appears on the street, she has no male visitors presented to her, and so far is this effacement carried that to inquire after a wife is regarded as near akin to an insult to the husband.

On the other hand, however, it is asserted by old residents in China that in matters of family economy, finance, politics, and the conduct of affairs the woman of the house has a wide range of influence, and in spite of the fact that female education is not recognized as existent, a wife generally manages to have her say in matters of interest connected with the family.

In Japan, women, girls, and children are very much in evidence, and the consideration with which women are treated, the respect shown them in public and private, and the freedom enjoyed by the women of this remarkable country are in marked contrast with the practice in all other eastern lands.

Woman in Dai Nippon enjoys, so far as can be understood by observation and inquiry, precisely the same status as her brother; has the same freedom from social restraints, has the same "right

An Execution in Pekin.—The spectators are more interested in the photographer than in the swordsman.

From Commander Harrie Webster's collection of Chinese pictures.

Rock Temple at Amoy.

From Commander Harrie Webster's collection of Chinese pictures.

of way," and works just as diligently in the field and in the workshop, and, what is more to the point, for *equal work gets equal pay!* This freedom enjoyed by women in Japan is not of recent growth. It is not the outcome of the emergence of the nation from aristocratic feudalism into the light and practices of modern politics and government, but has always existed, and is as much a matter of course as is the contrary in China.

The contrasts and comparisons made in the course of this paper are especially interesting when the histories of these two peoples are compared, for it would seem certain that the remote origins of the Japanese and the Chinese were far apart, the doctrine of modifications produced by environment being inadequate to account for the brain-fiber differences now existing between these two most interesting historical entities.

GEOGRAPHIC NOTES.

THE RUSSIAN ANNEXATION OF MANCHURIA.

BY the agreement concluded between China and Russia in December, the latter will exercise a protectorate over Manchuria in the same sense that the British maintain a protectorate of India. The 400,000 square miles of this province may thus be added to the dominions of the Russian Empire.

The conditions on which Russia consents to allow the Chinese officials to resume the civil government, which was taken from them last summer, are as follows (this agreement thus far applies only to Shengking, the southern and most important province of Manchuria, but it will be extended to include the other two provinces of Manchuria):

"(1) The Tatar General Tseng undertakes to protect the province and pacify it, and to assist in the construction of the railroad.

(2) He must treat kindly the Russians in military occupation, protecting the railway and pacifying the province, and provide them with lodging and provisions.

(3) He must disarm and disband the Chinese soldiery, delivering in their entirety to the Russian military officials all munitions of war in the arsenals not already occupied by the Russians.

(4) All forts and defenses in Shengking not occupied by the Russians, and all powder magazines not required by the Russians, must be dismantled in the presence of Russian officials.

(5) Niuchwang and other places now occupied by the Russians shall be restored to the Chinese civil administration when the Russian Government is satisfied that the pacification of the province is complete.

(6) The Chinese shall maintain law and order by local police under the Tatar general.

(7) A Russian political Resident, with general powers of control, shall be stationed at Mukden, to whom the Tatar general must give all information respecting any important measure.

(8) Should the local police be insufficient in any emergency, the Tatar general will communicate with the Russian Resident at Mukden and invite Russia to despatch reinforcements.

(9) The Russian text shall be the standard."

The "Boxer" movement was scarcely noticeable in Manchuria, and what little there was of it was easily suppressed by the more sensible of the provincial Chi-

nese officials; but the Chinese soldiery rivaled the Boxers of Pekin. Hundreds of miles of the railway were torn up in a single week by Chinese regular troops under the direction of local military commanders. This destruction has not yet been repaired.

It is stated on good authority that Russia has today in Manchuria, and along the frontier of this province, 3,900 officers and 173,000 men, with 340 guns. In addition, between 35,000 and 40,000 men will be despatched by sea to reinforce this large army, and many thousands more will proceed to the Far East over the Trans-Siberian road.

THE POWERS IN CONTROL IN CHINA.

DURING the second week of January, Russia turned over to Germany the Shanhaikwan Railway, which runs from Tientsin to Niuchwang. This road was built by British capital, but as it commands the route from Manchuria to Pekin, Russia seized it early last summer, and has operated it during the past months. On the arrival of Commander von Waldersee the protest of the British bondholders was submitted to him, but he decided against them and the British acquiesced in the decision. It is stated that von Waldersee will now hand the road over to its rightful owners, or at least what is left of the road, for Russia, it is understood, has succeeded in obtaining the following concessions: (1) That Russia shall retain half the rolling stock of the entire railway for the section from Shanhaikwan to Niuchwang outside the Great Wall, which is also in Russian occupation; (2) that Russia shall hold a lien on the railway within the wall for the expenses incurred in repairs, although made with railway property, and in transport operations during the Russian occupation; (3) that Russia shall appropriate the important workshops at Shanhaikwan with all their contents.

BRITISH PACIFIC CABLE.

THE recently awarded contract for the laying of the British Pacific cable from Vancouver to Australia via Fanning Island and Fiji, specifies that the line shall be laid by July 31, 1902, so that in eighteen months at the most the world will be belted by a complete cable system. Nine and one-half million dollars will be paid for the making and laying of the cable, which will measure, including slack, about 8,000 nautical miles.

Great Britain and Canada have agreed to defray five-ninths of this sum, New Zealand one-eighth, and New South Wales, Queensland, and Victoria have pledged to contribute the balance between them. It is proposed to charge 49 cents a word for messages to the United States and 25 cents additional for messages to Europe.

THE DEVELOPMENT OF SIBERIA.

THAT well-worn phrase, "The world of empire westward wends its way," is destined to be contradicted by the growth of Russia during the present century. One hundred years from now it is almost safe to predict the center of the Russian Empire in influence and enterprise, if not in population, will be east of the Ural Mountains.

The great tide of emigration, enterprise, and pluck that is following the iron rails of the trans-Siberian Railroad eastward are strikingly shown in a recent official publication of the Russian Government.

Siberia is roughly divided into two zones, separated by a broad belt of virgin

forest. The northern zone, cold and barren, stretches in an almost unbroken tundra to the polar regions. The southern zone is rich in those climatic and natural conditions that favor industry and perseverance, and it is this zone that the railway traverses.

During the two decades, 1860–1880, 110,000 people emigrated to Siberia; during the next 15 years this number had increased to 680,000, while during the last five years more than 1,200,000 persons, the majority sturdy Russian peasants, have settled there. The present population of Siberia is about 9,000,000.

So great has been the rush of traffic since the line was first opened in 1899 that the equipment has failed to equal the demands upon it.

Of the exports from Siberia corn, sent to the European markets, forms nearly one-half. Next come meat, butter (which is shipped in special refrigerator cars to London), tallow, hides, wool, eggs, and game. The chief imports are iron and ironware, sugar, cottons and woolens, machinery, and petroleum.

Even today, when the last stages of the Siberian road are not completed, the journey from London to Vladivostok by railway takes only a little more than half as many days, 24 to 42, as the journey by the Suez Canal. The easiest route between the two oceans is Havre, Paris, Cologne, Berlin, Warsaw, Moscow, Samara, Omsk, Tomsk, Irkutsk, Vladivostok — 7,500 miles. Of this, 6,400 miles, or six-sevenths of the whole trip, fall to Russian railways—4,100 to the Siberian main line and 2,300 to the European-Russian system, 700 to German, 100 to Belgian, and 300 to French lines.

The traveler can reach Shanghai from London or Paris, when the main trunk line is completed, in 16 days, and will have to pay $160 for his first-class sleeping-car express ticket, instead of being 42 days on the route and paying $450 for the journey.

The total cost of the Siberian road to date, constructed as it has been by Russians with Russian money, with all branches and auxiliary undertakings, including vessels and ports, is $385,000,000. In regard to this enormous cost the official report states:

"However large the total may be, it is insignificant in comparison with the advantages held out to Russia by the exploitation of the shortest railway route between the Atlantic and the Pacific, in conjunction with the stimulation of the rich productive powers of a vast country like Siberia and the development of Russia's commercial intercourse with the countries of eastern Asia."

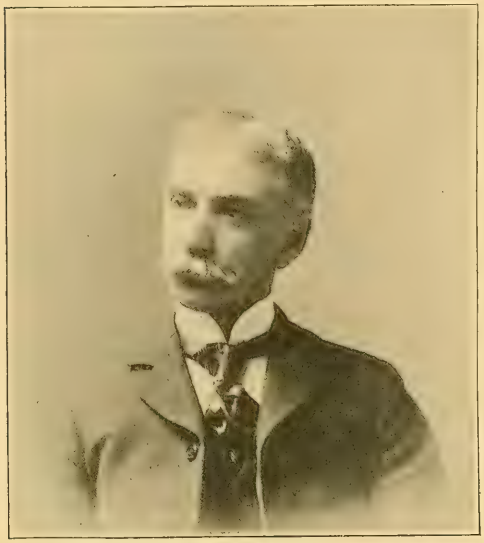
HON. O. P. AUSTIN.

MR. AUSTIN'S paper on a floating exposition, which is printed in the opening pages of the present number, was read by him before the National Board of Trade on January 24, at the special request of that body. The proposition, although a novel one, was received with such favorable consideration that a special committee, consisting of the leading officers of the National Board of Trade, the Philadelphia Museums, the National Manufacturers' Association, and the United States Export Association, was at once appointed to consider its feasibility, and, if found practicable, to formulate plans for a proper organization to put it into operation.

Mr. Austin has been Chief of the Bureau of Statistics since the spring of 1898, and during that time has prepared and published officially a large number of works on topics of current interest, including "Commercial China in 1899," "Commercial Japan," "Commercial South America," "Commercial Africa," "Cuba, Porto Rico, and the Hawaiian, Philippine, and Samoan Islands," "Russia and the Trans-Siberian Rail-

way," "The Colonial Systems of the World," "Submarine and Land Telegraphs of the World," etc., etc.

His earlier literary work prior to his entrance upon official life consists of a series of books on national affairs especially intended for the instruction of youth, including "Uncle Sam's Se-



crets," "Uncle Sam's Soldiers," while others of the series are still in preparation.

Mr. Austin is a member of the National Geographic Society, and as such his recent contributions to geographic and commercial information have been very favorably received and highly commended.

CUBA AND PORTO RICO.

THE U. S. War Department has recently published two volumes containing the results of the census of Cuba and Porto Rico, taken in the fall of 1899 under the direction of military officers. The volumes are indispensable to those who wish to obtain an accurate understanding of the present condition of these people.

The facts presented in the reports were gathered in all cases by the people themselves, as the most intelligent of the better classes were induced to compete for positions as census-takers by the relatively handsome salaries offered by the U. S. Government. The facts thus gathered were classified under the direction of Messrs. Henry Gannett and Walter F. Wilcox, statistical experts.

These handsomely gotten up volumes, containing many good illustrations, charts, and diagrams which emphasize the figures, can be obtained gratis on application to the War Department. Extracts from these reports, taken from advance sheets, have appeared from time to time in this Magazine, but some further notice may be of interest.

Porto Rico has only one-third of its population engaged in gainful occupations, while in Cuba the proportion is about two-fifths, and in the United States it is about midway between these two. It appears that the relative number of breadwinners is greater in cities than in rural districts. In Porto Rico a relatively larger proportion of women work for a livelihood than in Cuba, although the proportion is decidedly less than in the United States.

It is interesting to compare the kinds of occupation most popular in the islands. In Porto Rico sixty-nine in every 100 working persons labor on farms, plantations, in mines, or are engaged in fishing. In Cuba 48 in every 100, while in the United States only 39 are so engaged. In the manufacturing and mechanical industries, however, these proportions are reversed; in Porto Rico 8 in every 100, in Cuba 15, and in the United States 22 earn their living by transforming raw material into new forms.

THE ATLANTIC WEATHER SERVICE.

PROF. ALFRED J. HENRY, under the direction of the Chief of the Weather Bureau, has established during the last month a meteorological station at Hamilton, Bermuda. This station was needed to complete the chain of outposts planted at strategic points extending from the Lesser Antilles westward and northwestward to the British possessions. Bermuda is in the track of atmospheric disturbances which pass northeastward from the Florida coast, and which occasionally curve northwestward, striking the southern coast of New England. From this vantage point it will also be possible to forecast with greater accuracy the tracks of storms which occasionally develop great intensity in the Atlantic off the coast of the Carolinas.

Arrangements have also been made by the Weather Bureau for a daily cablegram from the Azores, giving the meteorological conditions in that part of the Atlantic, and also for a daily cablegram from London, summarizing the conditions west of Spain, France, and Ireland. As the forecasters of the Weather Bureau can now determine what conditions storms proceeding from the United States will meet, they are able to predict with considerable certainty the direction such storms are likely to pursue.

The U. S. Weather Bureau has already begun issuing to the captains of the trans-Atlantic liners predictions of the weather for three days out of New York.

The advance made in our knowledge of the laws governing meteorological conditions, and especially in the practical application of these laws to the interests of the mariner and the farmer, has been one of the most remarkable recent developments of science. Prof. Willis L. Moore, Chief of the U. S. Weather Bureau, believes that the time may come when scientists will so thoroughly understand these laws that they can with certainty forecast the seasons.

THE U. S. WEATHER BUREAU AT THE PARIS EXPOSITION.

THE United States Weather Bureau exhibit was installed during the month of April and opened to visitors for inspection in completed condition May 15. The building remained open and the exhibit accessible to visitors every day, except Sundays, from 9 a. m. to 6 p. m., from May 15 to September 30, and from 9 a. m. to 5.30 p. m. during the month of October. It was necessary to close a half hour earlier during the month of October on account of darkness, there being no way of lighting the building artificially.

The exhibit was visited by many thousands of people, among whom were meteorologists and those interested in related sciences from all parts of the civilized world. The cloud photographs, the method of making weather forecasts, and the kite and aerial apparatus attracted special attention.

Many interested in aeronautics and air explorations examined the kite exhibit in detail, taking photographs and measurements of the kite, instruments, and apparatus. Notably among these were a number of officers of the German, French, Italian, and Japanese armies and navies.

During the meeting of the International Meteorological Congress, which brought to Paris representative meteorologists from nearly all parts of the world, a special invitation was extended to its delegates and members to visit and inspect the Weather Bureau exhibit. This invitation was accepted, and therefore the exhibit brought the methods, instruments, etc., of the United States Weather Bureau to the attention of those most interested in meteorological work.

It was the special effort of those connected with the exhibit to explain and set forth in the strongest and clearest light possible the aims and methods of the United States Weather Bureau and its practicability and great economic value to the people of the United States and of North America. Special stress was given to the great importance and the value of its weather forecasts and warnings.

As a result of the visit of the Jury of Awards and their critical examination, the United States Weather Bureau was awarded a *Grand Prix*. Gold medals were awarded to two officials of the Weather Bureau, Prof. C. F. Marvin for instruments, apparatus, and appliances, and to Prof. A. J. Henry for cloud photographs.

THE LOSS OF PROPERTY FROM LIGHTNING.

IN 1898 systematic efforts were made by the United States Weather Bureau to ascertain the frequency of damaging or destructive lightning strokes throughout the United States. The results of the first year's work were published in *Weather Bureau Bulletin No. 26, Lightning and Electricity of the Air*, and also separately as *Weather Bureau Bulletin No. 199, Property Loss by Lightning, 1898*. The collection of statistics bearing upon the loss of and damage to property was continued during 1899.

The total number of reports received of buildings struck and damaged or destroyed by lightning during the calendar year 1899 was 5,527, about three times as many as were received during the previous year. In addition to this number, 729 buildings caught fire as a result of exposure to other buildings that had been set on fire by lightning.

The great majority of buildings struck by lightning were not provided with lightning rods. A conservative estimate by Prof. A. J. Henry of the total loss by lightning during the year would probably be $6,000,000. One-half of the buildings struck were barns, sheds, warehouses, etc., and about 7 per cent churches and schools; cattle, horses, mules, and pigs were killed by lightning to the value of about $129,955.

POLAR WORK.

PLANS for the Baldwin-Ziegler North Polar Expedition are maturing rapidly, for, unlike the majority of Arctic leaders, Mr. Baldwin is not hampered for want of funds. Mr. Ziegler, the multimillionaire behind the enterprise, has expressed a willingness to pay all expenses under one million dollars. Half a million was the cost of the Italian expedition of last year, and it was to the complete equipment that was thus possible that the Duke of Abruzzi partially owed his success.

Mr. Baldwin has chosen the Franz Josef Land route. He has had experience with Peary in Greenland and with Wellman in Franz Josef land, and is thus acquainted with the practical difficulties of both routes. Two ships will take the party north, one returning before the autumn ice blocks retreat, and the second remaining with the men through the winter. Mr. Baldwin plans to take a number of tough Siberian ponies with him. The chances are many against his being able to put them to any practical use, but the one chance is worth providing for.

The summer of 1901 will thus witness the simultaneous inauguration of the most systematic campaign to reach the North and South Poles that has ever been attempted. In the Arctics, Peary, Baldwin, Sverdrup, and a Russian party with a vessel of the type of the ice-breaking *Ermak* will push northward, while in the Antarctics two splendidly equipped expeditions, the German and British, will strive to reach the opposite extreme.

THE BRAZIL-FRENCH GUIANA BOUNDARY DECISION.

BY the award of the Swiss Federal Council, the arbitrators in the dispute as to the frontier line between Brazil and French Guiana, Brazil has obtained the main points for which she contended. Brazil obtains 147,000 square miles of the disputed territory and France not more than 3,000 square miles. The dispute dates back to 1688, when France claimed to the Araguary River, which is parallel to the Amazon The boundary as determined by the award is the River Oyapoc and, from the head source of this river to the frontier of Dutch Guiana, the line of the Tumuck-Humack range.

The decision of the Federal Council of Switzerland is a follows:

"1. That the Japoc or Vincente Pinçon of article 8 of the Treaty of Utrecht is the Oyapoc that debouches to the west of Cape Orange, as has been established by the documents which Brazil has submitted to the tribunal, and that the *thalweg* of that river, from its mouth to its source, definitively constitutes the first of the frontier lines between Brazil and French Guiana.

"2. That the other frontier line, from the source of the Oyapoc to the point of junction with the Dutch territory, will be that which article 2 of the treaty of arbitration indicated as an intermediate solution—that is to say, the line of division of the waters in the Tumuc-Humac Mountains, forming the northern limit of the Amazon basin."

ALEXANDROWSK.

ALEXANDROWSK, the little arctic harbor built by the Russian Government on the Murman coast two years ago, is becoming a modest center of arctic commerce. Although north of the arctic circle, it is free of ice the year round, as it is reached by an offshoot of the Gulf Stream.

A dam nearly 500 feet in length has been built to protect the harbor, which is deep enough for the largest ships. The town has now some 250 inhabitants, mostly officers and laborers, boasts 50 houses, a hotel, and several shops, and is lit by incandescent and arc lamps. The government does not expect the town to grow much larger, but it serves as an outlet for the trade of inland northern Russia, and is a clearing point for the considerable traffic of hides that come down the Obi and Yenisei Rivers.

A CORRECTION.

MR. LITTLEHALES has called attention to an erroneous statement in the note appearing in the January number of this Magazine, entitled "The Principles Underlying the Survey of the Bottom of the Ocean for an All-American Trans-Pacific Cable to the Philippines and the Orient." The correct equation to the curve which, by revolution around a vertical axis, would generate the theoretical form of an isolated submarine peak in which the crushing strength at any cross-section is equal to the combined weight of the portion of the formation above that section and of the superincumbent body of water is

$$y = \frac{\kappa}{\delta'} + \varepsilon^{\frac{2\delta'}{\delta} \log x},$$

in which ε represents the base of Naperian logarithms, κ the coefficient of crushing strength of the materials composing the crust of the earth, δ the average density of these materials, and δ' the density of sea water.

Colonel F. F. Hilder.

DEATH OF COLONEL HILDER

FRANK FREDERICK HILDER, soldier, geographer, and ethnologist, was born in Hastings, England, in 1836; he died in Washington January 21, 1901. Educated at Rugby in the approved manner of the times, he afterward graduated from the British military school at Sandhurst, and entered the army as a cornet in early manhood, at a time when the eyes of all England were turned on India. Sent immediately to aid in quelling the Sepoy rebellion, he soon saw service of such severity—and met it with such intrepidity—that he was awarded the Indian Mutiny medal, with special-service bars for Delhi and Lucknow.

It was during this period of his career that Hilder traversed the Indo-Gangetic plain, trod the Himalayan foothills, and visited the provinces and cities of the northwestern empire from Bombay to Kashmir, and from the Punjab to Nepal, laying the foundation for a broad, yet precise, geographic and ethnologic education; and some of the lectures of even the latest years of his life drew inspiration and significant detail from the researches enlivening these early campaigns. He saw service also in Farther India, Borneo, and the Philippines, and after rising through a lieutenancy to the rank of captain was transferred to Africa. Here he won the Egyptian medal, and his skill as military expert and organizer attracted such attention that after his return to his regiment in India he was recalled and promoted to a colonelcy at the express request of the Khedive.

In Africa, as in India, Colonel Hilder seized every opportunity for scientific research; but his tenure in the Egyptian army was cut short by the terrible experience of a sand-storm, which so injured his eyesight that he decided to abandon a military career. Coming to America on his recovery, Colonel Hilder met again the contagion of military spirit stimulated by our civil war, and did special work of importance in the Engineer Corps, but held so firmly to his election of a peaceful life as to decline an American commission. In the later sixties he became the international representative of a small-arms manufactory, and spent fifteen years chiefly in travel through the several Spanish-American countries; and during this period he acquired an extended and intimate acquaintance with languages and peoples, as well as with national leaders and policies. Impressed by the opportunities for international business presented by the actual and prospective republics of Spanish America, he established a house in Chicago, only to be ruined by the fire of 1871; later he combined business enterprises in St. Louis and Mississippi City with notable researches in the archeology of the Mississippi Valley. Unhappily pursued by conflagrations, he turned to research and publication, making important contributions to the projectors of the Pan-American Railway and the Bureau of American Republics.

Colonel Hilder acted as secretary of the National Geographic Society during the year ending June, 1899, afterward becoming Ethnologic Translator in the Bureau of American Ethnology. He continued in this position to the time of his death, though he was detailed as a special agent of the Pan-American Exposition for work in the Philippines during the earlier half of 1900.

As indicated by his career, Colonel Hilder possessed remarkably strong character; yet he was by instinct a naturalist and student, and devoted the best energies of his life to the increase and diffusion of knowledge. His later publications, through the Bureau of Education and the Bureau of American Republics, as well as through the NATIONAL GEOGRAPHIC MAGAZINE,

the *Forum*, and other standard periodicals, are well known ; while his graceful and instructive lectures, based on personal observations in India, Egypt, South Africa, Central America, the Philippines, and other remote regions, live in the memory of thousands.

W J M.

THE ORIGIN OF YOSEMITE VALLEY.*

MR. TURNER finds that the higher part of the Sierra Nevada has been glaciated, and in support of this belief instances numerous cases of glacial markings and morainal deposits.

If there is any one feature of the higher parts of the Sierra which stands out in bold relief, so that "he who runs may read," it is the fact that it has been covered by glacial ice in sheets and streams, and that at a very recent time. There is no need to search for glacial scratches or moraines. The whole aspect of the terrane is that of great sheets of bare granite, not yet covered with soil, with rounded surfaces, cut by deep U-shaped cañons, containing thousands of lake basins, and presenting cirques and hanging valleys ; in short, everything in the field of vision tells the story of a wholesale ice invasion. Nor was it a brief one, but one which lasted for many centuries, during which cubic miles of rock were carried away, cañons thousands of feet deep were excavated, and the level of the country planed down to an enormous extent.

As to the potency of a glacier for the work of erosion, Mr. Turner is among the few remaining upon the negative side. His argument, however, simply consists in a denial of the ability of a glacier to excavate gorges. That the gorges in the high Sierra were cut by glaciers is true nevertheless. They are plainly the result of channel, not valley, erosion, and channel erosion upon such a scale as this is done only by ice. The line of demarcation between channel and valley erosion in the cañons of the Sierra is clearly marked, and can be determined, one might almost say, to a foot—*i. e.*, the point at which the present visible marks of ice cease and those of water begin. I do not mean that the ice may not have excavated farther down the cañons, but that below certain points, easily distinguished, the subsequent action of water has masked that of ice. If other proof of the competency of glaciers to do the work of erosion upon a large scale were wanting, the presence everywhere of hanging valleys is in itself evidence conclusive. There is no other known agency which could produce them, and today we see them in process of production everywhere in glacial regions, notably upon the Alaskan coast, where there are thousands of them under construction before our eyes.

Holding such opinions concerning the erosive power of glaciers, it is to be expected that Mr. Turner attributes the creation of the Yosemite Valley to other agencies than ice ; indeed, he attributes it to aqueous erosion, aided by systems of fractures in the granite. He finds no significance in the fact that Tenaya Cañon is vastly greater in breadth and depth, as he states, than could be created by the present Tenaya Creek. He passes over without notice the significant fact that every stream, excepting Tenaya Creek, enters Yosemite Valley through a hanging valley, and that the character of the Merced Valley changes abruptly and suddenly to a V-shaped gorge two or three miles below Fort Monroe, at the foot of Yosemite Valley.

It is perfectly obvious to those familiar with glacial phenomena that Yosemite is

* *The Pleistocene Geology of the South Central Sierra Nevada, with Especial Reference to the Origin of Yosemite Valley.* By Henry Ward Turner. Proceedings of the California Academy of Sciences, Vol. 1, No. 9.

quite an ordinary and necessary product of glacial erosion, under the conditions prevailing in that locality. The main glacier came down Tenaya Cañon, cutting it to a steep but fairly uniform grade. Yosemite Valley is but a continuation of that gorge. The end of the glacier, at the time that it was cutting Yosemite, extended not far beyond Fort Monroe. It remained there for a long time, and therefore plowed out the bottom of the valley to a considerable depth. Branch glaciers joined the Tenaya Glacier when it filled Yosemite, coming down the valleys of Yosemite, Little Yosemite, Illilouette, and Bridal Veil and other creeks, and forming hanging valleys at the junction points. The formation of the vertical cliffs of the valley may have been due to undermining, and may have been aided by the cleavage of the rocks. On the recession of the glacier doubtless the bottom of the valley was occupied by a lake, which has since been partially filled by detritus, and drained by the erosion of Merced River cutting through the rock-wall at the foot of the valley.

HENRY GANNETT.

GEOGRAPHIC NAMES.

THE following decisions were made by the United States Board on Geographic Names, January 9, 1901 :

Bloyd ; mountain, Washington County, Arkansas (not Bloyed nor Bloyd's).

Bobs ; creek, Lincoln County, Missouri (not Bobbs nor Bob's).

Carroll; glacier reaching the sea at head of Queen Inlet, Glacier Bay, southeastern Alaska (not Woods).

Chiniak ; cape, the easternmost point of Kadiak, Alaska (not Greville. Hermogenes, St. Hermogenes, Spruce, Tolstoi, Tuniak, nor Yelovoi).

Douglas ; bay indenting south coast of Kupreanof Island, Sumner Strait, southeastern Alaska (not Douglass)

Grand Pacific; glacier reaching Reid Inlet from the north, Glacier Bay, southeastern Alaska (not Johns Hopkins).

Iskut ; mountain, and river tributary to the Stikine in southeastern Alaska (not Iskoot nor Skoot).

Izhut ; bay and cape on southeastern shore of Afognak Island, Alaska (not Ijoot, Ishoot, Pentecost, Sharipof, nor Whitsuntide).

Kates Needles ; mountain near Stikine River, southeastern Alaska (not Kates Needle).

Kisselen ; small bay at head of Beaver Bay, Unalaska, eastern Aleutians, Alaska (not Kissialiak nor Worsham).

Kupreanof ; strait between Afognak and Kadiak Islands, Alaska (not Karluk, North, Northern, nor Sievernoi).

Mooneyham ; branch of French Broad River, Cocke County, Tennessee (not Moneyhan nor Mooneyhan).

Mullin ; creek, post-office, and railroad station, Mills County, Texas (not Mullen).

Nez Perce ; county in Idaho (not Nez Perces).

Nishnabotna ; river in southwestern Iowa (not Nishnabotany, Nishnabotena, Nishnabotny, Nishnabotony).

Reem; creek, Buncombe County, North Carolina (not Reams nor Rims).

Rendu ; glacier reaching the head of Rendu Inlet, Glacier Bay, southeastern Alaska (not Charpentier).

Scajaquada ; creek, in Buffalo, Erie County, New York (not Seajaquada, nor Scajaquady).

Yellow; point on eastern shore of Tamgas Harbor, Annette Island, southeastern Alaska (not Signal).

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY

Popular Meetings.

November 9, 1900.—Prof. Willis L. Moore in the chair. Dr. M. H. Saville, of the American Museum of Natural History, New York city, delivered an illustrated address, "The Ancient City of Mitla, Mexico."

November 23, 1900.—Mr. Marcus Baker in the chair. Gen. A. W. Greely, Chief Signal Officer, U. S. A., delivered an illustrated address, "A trip through Alaska."

December 7, 1900.—President Graham Bell in the chair. Dr. W. A. P. Martin, President of the Imperial University at Pekin, delivered an address, "The Siege of Pekin."

December 18, 1900.—Mr. G. K. Gilbert in the chair. Capt. Ewart S. Grogan, the first white man to cross Africa from south to north, delivered an illustrated address, "From Cape to Cairo."

December 21, 1900.—President Graham Bell in the chair. Mr. Gifford Pinchot, Forester, U. S. Department of Agriculture, delivered an illustrated address, "The Proposed Appalachian Park."

January 4, 1901.—President Graham Bell in the chair. Mr. Joseph Stanley-Brown delivered an illustrated address, "The Franciscan Missions of Southern California."

January 18, 1901.—President Graham Bell in the chair. Mr. Arthur P. Davis delivered an illustrated address, "The Isthmian Canal Routes."

Technical Meetings.

December 14, 1900.—President Graham Bell in the chair. Papers were read as follows: "Winter Precipitation in Relation to Irrigation," by Dr. H. C. Frankenfield; "The Survey for an All-American Cable to the Philippines and the Orient," by G. W. Littlehales; "American Arc Measures," by C. A. Schott.

January 11, 1901.—President Graham Bell in the chair. Papers were read as follows: "The Stenometer as a Distance Measurer," by W. J. Peters; "The Establishment of Compass Deviation Range-marks on Delaware Breakwater," by D. B. Wainwright; "A Topographic Cycle on Glaciers," by G. K. Gilbert.

Announcement of Meetings.

February 1, 1901.—"Mexico, Her Characteristics and Recent Progress," by Dr. Don Juan N. Navarro, Mexican Consul General at New York.

February 15, 1901.—"Explorations in Abyssinia," by Otis T. Crosby.

March 1, 1901.—"The Recent Famine in India," by Gilson Willets.

These lectures will be delivered in the Congregational Church, 9th and G streets, at 8 p. m.

TECHNICAL MEETINGS for the reading of papers and discussion will be held in the hall of the Cosmos Club on the evenings of February 8 and 22.

The committee having in charge the formation of the programs for the technical meetings of the Society desire to invite members to report to the Secretary of the Society the titles of communications bearing upon geographical research that are available for presentation to the Society during the months of February, March, April, and May, 1901.

The subject of the LENTEN COURSE of lectures for this year is "The Countries of Asia." The first lecture of the series will be at 4.20 p. m., Tuesday afternoon, February 26, in the Columbia Theater, 12th and F streets, Washington, D. C.

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THE POPULAR SCIENCE MONTHLY for February is a number that should be in the hands of every one who is interested in science. The opening article, on the "LIFE AND WORK OF HUXLEY," by Lord Avebury—perhaps better known in America as Sir John Lubbock—is an extremely interesting account of the great naturalist by one of his most intimate friends. The publication of Huxley's "Life and Letters" makes this article particularly timely. Dr. George M. Sternberg, Surgeon-General of the U. S. Army, contributes an account of malaria and the recent work demonstrating the connection of this disease with mosquitoes—perhaps the most important scientific advance since the discovery of the X-rays, here described by the leading American authority. Mr. Havelock Ellis, editor of the "Contemporary Science Series," begins a series of articles on "British Men of Genius," an extremely interesting statistical and scientific study, now first made possible by the publication of the "Dictionary of National Biography." Professor Simon Newcomb contributes an installment of his "Chapters on the Stars," treating the clustering of the stars and the Milky Way. Professor Newcomb is probably the most eminent American man of science, while at the same time he possesses rare literary ability in presenting clearly and simply the great principles of science. Other articles in the number are an account of important contributions by Professor T. C. Chamberlin, to a theory of the glacial period, by Mr. Bailey Willis, of the U. S. Geological Survey; a description of the New York Aquarium, with illustrations by Professor Charles L. Bristol, of New York University; a description of the Dolmens of Rocknia, by Professor A. S. Packard, of Brown University, and an account of the way in which the weather is treated and mistreated in the newspapers, by Mr. H. M. Watts, of the *Philadelphia Press*. The number contains, as usual, departments devoted to correspondence, to scientific literature, and to notes on the progress of science.

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THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. XII MARCH, 1901 No. 3

CONTENTS

ABYSSINIA—THE COUNTRY AND PEOPLE. BY OSCAR T. CROSBY . . . . . PAGE 89

THE OLD YUMA TRAIL. BY W J McGEE 103

THE SEA FOGS OF SAN FRANCISCO. ILLUSTRATED . . 108

GEOGRAPHIC FACTS FROM REPORT OF THE TAFT PHILIPPINE COMMISSION 114

THE PHILIPPINE EXHIBIT AT THE PAN-AMERICAN EXPOSITION. BY D. O. NOBLE HOFFMANN 119

GEOGRAPHIC NOTES. ILLUSTRATED 123

GEOGRAPHIC LITERATURE 126

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY . 127

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THE NATIONAL GEOGRAPHIC MAGAZINE

ABYSSINIA—THE COUNTRY AND PEOPLE

By Oscar T. Crosby

On leaving Paris in December, 1899, I went first to Constantinople, as I wished to journey across the interior of Turkey down the Mesopotamian Valley; but on my arrival at Constantinople our representatives at the American legation informed me that not less than thirty days would be required for obtaining permission to go into the interior. Passports to the great sea-coast towns of Turkey are had as readily as those for any European city, but the Ottoman Government is unwilling that travelers should penetrate into the rather loosely governed portions of Asia Minor unless provided with other special letters insuring as far as possible the safety of the bearer. The necessary delay being greater than I cared to make, I left Constantinople for Cairo.

The Austrian captain of the Egyptian vessel piloted us for five days across the Mediterranean without making any astronomical observations whatever.

Arrived at Cairo, a fortunate chance gave me acquaintance with Sir Rennell Rodd, Secretary of the British Agency, which means, substantially, Secretary of the Egyptian Government in Cairo. This gentleman had made the journey to Addis Abeba a few years ago at the head of a mission whose object was to cultivate the friendship of and obtain treaty with the African monarch. From Sir Rennell I obtained the first detailed information as to how I might get into Abyssinia, and through the kindness of other British officers stationed at the arsenal I was enabled to buy a few rifles and some ammunition. The sale of fire-arms generally is strictly controlled in Cairo, as it is in most oriental countries.

In Cairo, too, I was able to have packed in wooden cases a stock of excellent provisions, the selection of which was largely suggested to me by the provision merchants who had supplied several of the Nile expeditions of troops. An example, however, of the importance of detailed knowledge was given me when, on getting into the interior and being required to use the small Abyssinian mule for transport, I found it necessary to cut down these boxes, which in Cairo were supposed to be quite the right size, and which had been satisfactory enough on camels, and probably would have

been satisfactory enough on a full-sized mule.

Here, also, through the kindness of the American mission, I acquired a very doubtful asset in the person of a shop-worn, old Abyssinian, who had left his native land as a boy and had been too much cared for by a succession of missionary friends, who had brought him up into a softened old manhood. His qualifications were honesty, a knowledge of the two principal Abyssinian tongues, together with sufficient English to keep me from going mad; and a helplessness which assured his fidelity to me when we were in strange lands.

With about twenty boxes of provisions and the ancient Michael Gabriel, I took ship at Port Said on a tramp vessel bound for Aden. Until the comparatively recent establishment of Jibuti, in French Somali Land, Aden was the only seaport near this portion of the African coast which one could reach by steam vessels plying to or through the southern end of the Red Sea.

It would have been possible to take an Italian ship for Massawa, and to begin there the journey toward the interior, but I was told, and could well understand, that the sad disasters suffered by the Italians in recent years had reduced Massawa to a point of almost negligible importance, and, moreover, there I would have had more difficulty in obtaining the necessary consent from Menelek for the interior journey than at Jibuti or Zeila.

Aden is famous the world over as one of the hottest and in all natural ways one of the most detestable places frequented by civilized man. My first day or two at this point, housed in one of the two strange little inns which the traveler may find, quite bore out the popular conception of the place; but soon acquaintance with the hospitable British officers made the place seem to me quite a pleasure resort. I saw then, more clearly than in Cairo, which is now quite European, the splendid talent of our British cousins for making themselves and their guests almost comfortable and entirely contented in all sorts of conditions.

A score of forgotten, but at the last moment much desired, articles were obtained, and all the purchases were found in good condition when I arrived in Zeila save only that the sea biscuit, which I had ordered to serve as bread, had been forgotten by the packers. The result was the important discovery that one can get along tolerably well without bread.

A little steamer coughs its way across once a week from Aden to Berbera, thence to Zeila, thence back again. On this Michael Gabriel was sent a week ahead with instructions to deliver a letter to Captain Harold, the British officer in command at Zeila, and, with his permission, to get together some camels.

When I reached Zeila, Michael seemed to have gotten close to only one camel. That one had managed, even with its soft pad, to kick Michael's shin into collapse and make him mourn the difference, which he declared to be well marked, between the Somali camels and his humped brother of Asia Minor and Egypt.

A few Somali servants had been engaged in Aden, one of whom tried to desert when the little ship stopped at Berbera, but we were finally landed safely, carried in chairs on the shoulders of strong, young natives through the shallows to the shore. Zeila is a seaport, not a harbor.

Captain Harold put me up at his modest Presidency, and his kindness followed me at every moment in all the detailed organization of the caravan. A trade with camel men was made at so much a load for the distance from Zeila to Gildessa. Additional and trustworthy men were engaged for my personal services, and happily two small mules, the only two in Zeila, were sold to me as saddle animals for myself and companion.

As I had a very natural desire to see French Somali Land, I went over in a day's sail in a native boat from Zeila to Jibuti. This seaport is not more than ten years old, has about eight thousand inhabitants, loyal natives, and is already rather neatly built—a low-roofed, white, tropical French town with a good harbor. Ships of the M. M. line stop about twice a month, and, more than all, as to its future importance, it is the starting point of a railway which French capital has pushed to the interior. A year ago the work was completed for a distance of forty miles, with considerable preparatory grading for some distance ahead. The workmen must be guarded at all times by soldiers, who are for the most part from the west coast of Africa. There is an occasional outbreak; a few Italian or Arab laborers are killed by a rush at night; yet through it all the patient stockholders in Paris are backing up the efforts of their representatives, who are building a railway that may be small, indeed, in commercial value, but, on the other hand, may have a very large political significance. At least it may be said that this railway enterprise does very much to offset what would otherwise be the preponderating influence of Great Britain upon the future Abyssinian question, due to the large British possessions which almost surround Menelek's domain.

I found in Jibuti that arms were sold in very large numbers, and indeed all caravans which I saw starting for the interior during three or four days' stay bore boxes marked "*cartouches.*" Nearly all imports to Abyssinia other than arms go by way of Zeila.

Having finally chaffered myself into the ownership of a third mule, I started back to Zeila, across the desert, accompanied by a follower who had walked across a night or two before. There was really no great danger, since the whole coast is under the power either of the French or English, but a white man without arms is not thoroughly understood by the natives, and the killing of any man in any manner reflects great credit upon the slayer. Indeed, it was feared that a weaponless white man might be considered as a derelict which could not be put to better use than by a kind of innocent slaughter, quite without personal animus. However that may be, I got across the desert, a distance of forty miles, in about eight hours of very hot riding, relieved by a very splendid mirage effect on approaching Zeila, whose low dingy houses became a glittering row of splendid white palaces.

Finally sixteen camels, with proper loads, were gathered, a well-defined bargain was made for their hire, and we drifted out upon the desert, camping only eight miles from Zeila the first evening. Here the sweet silence of the desert fell upon us, broken only by the chatter of men and grunt of camels; then the night finds its true voice, the complaining cry of the hyena. Subsequently in the long march one day was very much like another, so far as the movement of the caravan was concerned. Little difference was made even by changing transport to mules, for with either animal the average journey, when not carrying food, must be in the neighborhood of twelve miles a day.

The African camel starts out on such a journey with no stored-up fat, and he must have a few hours a day in which to nibble at the thorn bushes, which are found almost everywhere in this east shore desert. The mule cannot subsist on thorn bush; hence he is not used in this region, but in the grassy country he must have a few hours for grazing, so that substantially the day's march averages not more than five hours.

When it comes to mountain-climbing the camel is very inefficient, and is rarely used. The little barefooted mule, native to Abyssinia, is the only and very excellent means of transportation. He carries about 120 pounds weight, and con-

tinues to carry it when his back and side have become lacerated to a most sickening degree. These mules are bought at the average price in our money of $25, and horses for about half that sum. They can be more readily had for purchase when one has reached the Abyssinian country than camels can be had in Somali Land.

At Harar the donkeys and camels are dropped and the mule, whose services thereafter are almost universal throughout Abyssinia, comes into use. For the journey to Addis Abeba a mule caravan of twenty-five mules can be gotten together in the course of a week at Harar, if one is very industrious, but it would be impossible, apparently, to get any one man to contract for twenty-five mule loads. There were in my small caravan of twenty animals six independent owners. Fortunately they all have pretty nearly the same habits and this constitutes the only bond between them.

Having become after the first ten days' march from Harar quite desperate on account of daily disputes as to where we should camp, I insisted upon the appointment of one spokesman with whom I might deal every evening in determining the following day's march. All solemnly agreed to stand by such decision as their chosen spokesman and myself might reach, and they held to the agreement for just two days. I learned, however, that they were not altogether a vicious lot; they were merely stubborn children, so far as conduct was concerned, and, moreover, in respect to the marches which the mules could stand, were much wiser than I.

My agreement was that I should be landed in Addis Abeba in twenty-five days from the start at Harar, and after all my vexations they carried out that part of the contract. Two-thirds of the contract price was paid at the beginning of the journey, the remainder in Addis Abeba. They all expect something in the way of *backsheesh*, and those who had been most troublesome were, of course, most importunate.

In pushing beyond Addis Abeba it was impossible to get a hired caravan, as there is no such regular means of conveyance. I was able, however, after a twelve days' stop, to purchase seventeen mules; but this was by happy chance, due to the fact that Colonel Harrington, the British diplomatic agent, had thirteen of these mules already in hand, left in his care by some English traveler who had passed through eight or ten months before. Here also, hoping to find the horse a little more variable in his paces than the mule, I bought two, one for my assistant and one for myself. It was a relief as compared with the slow dog trot of the mule; but in the exceedingly rough marching which had to be accomplished on reaching the Blue Nile, the horses soon played out. One of them had to be shot, and the other was turned into the caravan and bore about half a load.

The camel men from Zeila and the Somali, whom I had engaged as personal attendants, were all Mohammedans.

The mule men from Harar to Addis Abeba were Abyssinians, but of mixed faith, there still being a considerable Mohammedan element in southern Abyssinia, due to a great invasion which took place two or three hundred years ago under a leader who was doubtless of Arabian family and whose first followers were the Mohammedanized Somali. Many Galla, who constitute one of the most widely distributed people in northeast Africa, were also converted and many have been permitted by their present rulers, the Abyssinians, to retain their faith.

From Addis Abeba on to the Sudan my followers were of Abyssinian Christian creed, with only four or five Mohammedans, these being the Somali who accompanied me from the coast throughout the journey. Although they could not eat of the same food, there was not

a great deal of friction between the two tribes. On several occasions, when I was lucky enough to shoot a deer, a Somali and an Abyssinian would enter a good-natured foot race, each with drawn knife, the winner being able to give the finishing cut-throat blow to the animal and thus obtain for his companions fresh meat which the others would not deign to touch.

The mule caravan was used to carry me through all the known and unknown country from Addis Abeba northwesterly to Famaka, on the Blue Nile, where at last a white face was seen again—that of one of those solitary young English officers who may be found in so many faraway spots doing the empire's hardest work. At Famaka the caravan was dismissed, the men returned to Abyssinia, and the rest of the journey to Khartum performed in a native boat, which was rowed and pushed down the river 450 miles in thirteen days.

The country which I traversed may be divided, so far as physical characteristics are concerned, into three parts:

First, the Somali desert lands, extending from the coast to the neighborhood of Gildessa. In this region water is to be had only by digging holes in the sand, some of which remain in a tolerably permanent condition, so that it may not be necessary for each caravan to freshly scoop the day's supply. In other places the natives have learned from experience that in the dry river beds water can be found from one to six feet below the surface, and the position of the camp is determined accordingly. The men refused to use the spade and shovel which I had carefully provided, and scooped a hole with their hands, and in the course of five or ten minutes the bottom of the hole would fill with trickling water, quite brown with sand but otherwise good.

In this region a hot night follows a hotter day; yet there is a sort of cleanliness due to the lack of moisture, and one feels less than might be supposed the absence of water for bathing purposes. Indeed, on several occasions I learned by experience that Mohammed was speaking merely the ordinary practice of his desert-dwelling people when he prescribed the use of sand as a substitute for water in the execution of those ablutions which his creed orders as a part of religious duty. The desert is not entirely of sand. Sometimes it is rather sandy than sand, and in such cases it is generally widely covered with large and small volcanic stones. It is a land of desolation, but a land of peace, and few who have seen it but would gladly go there again for rest.

The next region, the great Abyssinian plateau, shows rather barrenly in spots, but for the most part is a tolerably well-watered and pleasing country. There are wide, rolling prairies, which show brown toward the end of the dry season, but are green during the rainy season and the earlier part of the dry. Splendid trees are found on some of the mountain sides and elsewhere in isolated groups, but, generally speaking, there is a sad dearth of forest growth.

After the exceedingly arduous work of climbing up the sides of this great escarpment, one may travel for many days over easy country. It is this great plateau which the Abyssinian have held against all comers for so many centuries, and now that they have the rifle it will be a bloody task for men who would dislodge their power over it.

This great region is cut deeply in two by the Blue Nile, whose waters run in a chasm five thousand feet below the plains, where I first crossed it, and about the same level at the two other points where I was able to descend to it. It was this upper Nile region and the region lying at the foot of the westernmost escarpment along the Blue Nile which had not heretofore been visited by white men. The descents were made chiefly on foot and were very difficult.

The third region is that into which one descends in the neighborhood of Wombera, and where one finds, after a very few days' march from the foot of the mountains, the beginning of the characteristic Nile scenery. The country is flat, covered for the most part where neglected, with the mimosa, which here grows to a considerable height, although it is a very near relative of the stunted thorn bush, familiar on the Somali plains. The palm, however, and a number of other good wide-spreading trees of the fig family appear to relieve the ugliness of tree-life. I shall not be able now to describe in any detail the splendid physical features which impress one on passing over the great plateau and in crossing the Nile, the Tchencha, the Bolassa, and other inflowing streams.

It will be sufficient to say that the western part of Abyssinia upon which I am now able to report to the civilized intelligence is a beautiful region, quite as attractive as any of the already known portions of the Abyssinian plateau.

As to the peoples met with, they were the Somali, already familiar to travelers; Abyssinians, about whom much has been said and of whom I shall give some of my impressions; the subservient Galla, the Agaa, the Shankali, the Sudanese, and the Shinasha, a small but interesting tribe, unknown, I believe, until this journey was made.

The great part which the Sudanese have played in the drama of modern Egyptian history is already known.

The Somali is not likely to attract the world's attention in any great degree, as he is now quietly subject to a British protectorate in the country back from the Berbera and Zeila coast and to a French protectorate in the small region around Jibuti. There are, perhaps, not more than half a million, and many of these are becoming more or less civilized by reason of the influence of the coast towns.

What struck me particularly in British Somali Land was the fact that three Englishmen constituted the whole white force engaged in the business of this protectorate. There are some East Indian assistants and a few East Indian troops, thirty-five or forty in all. There are some Greek, Armenian, and East Indian merchants in Berbera and Zeila. The control seems to be largely a moral one, so far as direct influence is concerned, based on a clever handling of the tribal chiefs, who are kept in the coast towns as "justices of the peace," but in reality as hostages.

MENELEK.

Of the Abyssinians, Menelek is the greatest, not because he is the king, but he is the king because he is the greatest. He is emperor of the Abyssinians by virtue of having conquered a great many difficulties, most of which yielded only to the sword or rifle. He is not of that pure Semitic stock which some thousands of years ago seems to have come over first and to have later received reinforcements, from time to time, across the Red Sea from Arabia, and even from Judea. His father was of a kingly family that professes to trace its ancestry to a union between Solomon and the Queen of Sheba. Our accepted authorities in respect to Solomon do not mention this particular *amour*, but that may have been merely overlooked by time.

Menelek's mother was a woman of low origin, and it may be that this cross-ancestry, while depriving him of the pure, finely chiseled facial type which many of his nobles have, and giving him the negroid face instead, may have added something of vigor, since we know that to be too pure-blooded means sometimes to be thin-blooded. One may fairly say that, while having the advantage of noble paternity, Menelek has fairly fought his way to power.

He is eagerly curious to see all new things that Europeans have painfully

brought up to his court, five hundred miles by caravan; yet, of course, he cannot make use understandingly of more than a few. I remember when first presented to him, as he sat in a doorway of the largest room in his residence, a rather confused mass of presents; Sèvres vases from the French Government, phonograph boxes, sextants, and such objects were piled up behind him. He received me by appointment, through Colonel Harrington, who with his assistant, Mr. Baird, had given me the hospitality of their compound. The black, kindly face indicated patience as well as strength, and his manner was that of quiet dignity.

Following the well-established custom, I had with me a few gifts to present to His Majesty, who had sent me goats, bread, and tej. Two large volumes, with illustrations of scenes of our own country, of its cities, mountains, waterfalls, etc., I offered in the hope of making known the land of the free. Through the very excellent interpretation of a young Abyssinian attached to the British agency, I endeavored to explain the geographical relations of the United States to the rest of the world, but I am quite sure that I did not make a brilliant success. The difference in time between New York, which I mentioned as being our biggest city, and Addis Abeba seemed to interest His Majesty very much, but not understandingly.

Menelek seemed to have some appreciation of the magnitude of the Brooklyn Bridge and of the Capitol, yet the absence in his own language of any defined measure of distance left me doubtful as to whether, in spite of his unceasing efforts to understand things European, he is really able to mentally interpret such great dimensions. He has never seen a house larger than his own, unless possibly the neglected ruins of a considerable building erected by the Portuguese about 300 years ago in Gondar, once Abyssinia's capital.

As the Abyssinian is unable to make anything save the round hut, the royal residence was built by East Indian carpenters of rails wottled together and more or less heavily covered with mud, the roof being straw and mud thatch. This palace or Gébi might pass for a fairly comfortable country house, shabby for want of paint. Nor has Menelek ever seen a boat, save the sections of one of poor Marchand's little flotilla lying covered up in front of the Gébi hundreds of miles from any navigable water, telling in its mute, sad way of Fashoda, that well-known story of bravery and blundering.

What I most relied upon as clinching in the royal mind a tolerably defined idea of our country were the pictures of some of our cotton-manufacturing establishments in New England. This I described as the place where were manufactured practically all the cotton goods which constitute the clothing of all of his most advanced subjects. I had noted with surprise and pleasure in Aden, Zeila, and Harar that American cotton goods were the only cotton goods in evidence.

Referring to a map, I further explained that another English-speaking country lies to our north, and that this country was a part of Great Britain's empire. So far as my object of instruction was concerned, I think in this point I overdid it. This reference to Canada, with my statement that all the people in my country spoke English, coupled with the fact that I came in a certain sense under the wing of Colonel Harrington and accompanied by his interpreter, evidently left a blurred impression of my relation to the American eagle. At any rate, when finally written permission was given to me to go into the unknown country to the northwest, I was described as Mr. Crosby, *the Englishman*.

The Emperor was clad in modest, even severe, garb, the chief vestment being

a black-silk burnous. He wore stockings, but no shoes. A tightly drawn turban covered what is said to be a well-developed baldness. Menelek is a hard-working ruler, rising at three or four o'clock in the morning to receive reports that have come in by mule courier from various sections of his empire and to dictate responses.

He is said to be unable to write, and perhaps would consider it undignified to use the art if he possessed it. Till nine o'clock in the morning he is busy with his dispatches, and, it may surprise Americans to know, conducts business with Harar, his most important town, about 200 miles away, by a telephone.

There is nothing more bizarre than to find a long-distance telephone line in this kingdom, which is, so far as mechanical arts are concerned, very benighted; yet as one follows the main highway of the kingdom by toiling over mountain trails, which almost defy even the patient mule, one scarcely loses sight for a distance of nearly 200 miles of the familiar telephone pole. This is the work of a few enterprising Frenchmen, the same who are at the head of the Jibuti Railway enterprise, aided by a Swiss, M. Ihlg, who has been the right hand of Menelek for something like twenty years.

How much there is of the commercial, how much of the political element in this extraordinary work of these Frenchmen, I do not venture to say. They undoubtedly appear to Menelek as the chief interpreters of all the glories of our mechanical civilization. His army is supplied with their rifles and cartridges, and may the day be long distant when these French-made bullets shall be directed against European troops of whatever nationality.

After nine o'clock Menelek is ready to receive those of his subjects, great or small, who claim access to him, and also the occasional European who travels to this strange mud-hut capital. He has learned that there are some costumes appropriate to ceremonial occasions, and out of respect to this knowledge I had been advised by Sir Rennell Rodd to take a dress suit for presentation to the court, and this I donned at nine in the morning and in it rode the mile and a half or two miles separating the British compound from the Gébi.

When these visits have been completed Menelek gives much detailed attention to the buildings and the meager workshops which his East Indian employés have set up for him.

His capital city contains huts, large and small, which may lodge a population of about ten thousand. A considerable part of this city is still of canvas.

The extremely cold nights, with a temperature sometimes as low as forty degrees Fahrenheit, after a day of one hundred degrees in the shade, have caused the Abyssinian on this high plateau to want some shelter.

My Somali servants, who suffered far more than the plateau people, were with difficulty forced to put up tents which I had provided for them, their life-long habit of sleeping in the open air being hard to break.

The difficulty of obtaining firewood will probably necessitate the moving of the capital within the next fifteen or twenty years. As there are no roads, a wheeled vehicle being unknown, firewood must be brought in by hand from the surrounding forests; and as the nearby timber is destroyed, this difficulty will soon become one of great moment.

Several deep ravines cut the town into three or four sections, and in the rainy season these sections are permanently separated from each other, bridges not being attempted.

In the whole kingdom I think there are three permanent bridges. One of these is over the Hawash, which must be crossed in order to reach Harar and the coast. This bridge was built under

the direction of M. Ihlg. Two other bridges, of stone, one of which I crossed north of the Blue Nile, were constructed years ago under the direction of some Greek priest.

The Abyssinian seems quite unable to follow the lead of any such work and is capable of only the most rudimentary accomplishments in mechanical arts; he can work a pretty good saddle of wood, he fashions a fair piece of metal into a sort of spear, and he can make, as already described, a tolerably tight hut, without a chimney, and weave a loose, rather comfortable, cotton or woolen garment.

The paltry ornaments which are found in the market places are not better than many that some of the typical African tribes can make.

Nevertheless the pure-blooded Abyssinian shows his Arabic origin, as, in spite of this very low development in the mechanical arts, he stands head and shoulders above all ordinary African people in the development of his language and his religious ideas.

Except when dealing with the black tribes whom he has subjected, Menelek carries on the business of his government by written orders in the Amharic language, the common spoken medium. It is of Semitic derivation, as is also the language of their holy books, now extinct save in some remote parts of the province of Tigré. This ancient language is known as Geez, and in it those books of the Bible with which they are most familiar are preserved. It is to be remembered that these people were Christians when our forefathers were painted blue and worshipped Thor and Woden. A shipwrecked priest from Alexandria somehow made an easy convert of the reigning king about the year 330 A. D.

The country is dotted with big round mud huts, which are churches. The priestly order, although vastly ignorant, is not without power. They inculcate, doubtless in good faith, many superstitions, but with it all are firm believers in the principal tenets of the Christian doctrine.

I found by inquiring of a priest in a small far-away village that he was unable to read the sacred books which he sold to me. He said that was the business of the high priest.

Rude paintings are found on the partitions inside the churches, representing various saints, cheek by jowl with such dignitaries of the Abyssinian social order as had contributed to the making of the church. The artists are not typical Abyssinians. In considerable part, so I was told, the work of the churches is done by the Falasha, remnants of a Jewish tribe still stubbornly living apart and maintaining the Jewish creed and considering themselves defiled by conversation with Abyssinians.

No one can doubt that Jewish influence was at one time very great in this territory, and it seems to me highly probable that Frumentius, who converted the Abyssinians to Christianity, may have found his task the easier because of some perverted knowledge of the Jewish prophets.

At a later date, about the year 1000, a Jewish princess, Judith by name, established her family on the throne, which held sway for something like 200 years.

Altogether it may be said that the origin of the Abyssinian people fully warrants the Arabic word "Habeshi," from which we have our word "Abyssinia," and which means mixed.

It is possible that before the Semitic invaders settled in this fertile land some small influence from the great Egyptian civilization around the mouth of the Nile had been pushed up and up along the stream, through the desert, to where it must have been merged with the native element, presumably black, then holding the soil. I feel convinced that this influence must have been small, because of the very great difficulty with which in-

tercourse could have been maintained between this upper region and lower Egypt. For a thousand years the Abyssinians were cut off from the rest of the world, and maintained the Christian doctrine as implanted by Frumentius.

Then came a period of contact with the Church of Rome, through the efforts of Portuguese missionaries and soldiers, at a time when that brave little kingdom sent its intrepid sons to every quarter of the globe. This missionary effort, however, added a very bloody chapter to the history of Abyssinia, and finally all white men were expelled, and again the gates were closed, and a period of something like 150 years elapsed before any further knowledge was had of things Abyssinian.

Since that time travelers have given very complete accounts of the country and its people; the touch with Europe has been again made intimate and bloody, through the efforts of the Italians to extend their power over Abyssinia.

This effort closed in the terrible tragedy at Adowa, where the flower of the Italian army was destroyed by Menelek's hosts. In spite of the errors, which it is easy now to mark, in the conduct of the Italian army, I feel very strongly that the Adowa campaign must have more nearly represented the probable outcome of any other European effort against united Abyssinia than did the Magdala campaign which the British conducted in 1867. Theodore, the emperor, after years of factional strife, was bereft of nearly all his followers when a British force, consisting of 13,000 men and 7,000 camp-followers, took, without the loss of a single life in action, the stronghold in which he had been left by his own people.

Attached now to the British agency as a sort of pensioner is a certain Irishman, wholly Abyssinianized, who was one of the servants of these imprisoned officers whom the great army at Magdala released. He was pointed out to me by Colonel Harrington as representing something like £2,000,000 to the British Government, that being the *pro rata* cost of saving the lives of Theodore's captives. He cannot be disposed of at cost price.

Due to the trouble which the white man seems to have brought into his country, Menelek has been, for one so eager to tread the path of civilization, rather slow to give permanent hold to white interests. The concession to the railway people was a marked departure, and subsequently the concession to some English mining people for work in western Abyssinia marks another step toward progress and national destruction.

Menelek is indeed at the parting of the ways, and all the while is earnestly seeking the betterment of his people as well as his own glory. I believe he is leading them to the brink of destruction. Such are the ways of the Omnipotent in bringing about the spread of what we call civilization, to drink of whose cup is to the barbarian to drink of poison. What will happen when Menelek dies, nobody knows. If some strong man of the "Abyssinia-for-the-Abyssinians" variety can grasp the reins, the autonomy of the country may yet be maintained for a long while, and together with it the ignorance of the people.

Their Christianity sits upon them lightly, as I found, for example, in respect to the institution of polygamy.

Menelek himself sets an example of monogamy, having one wife, who is a woman of considerable influence and of very good heart. But many others have not received that part of the Christian doctrine which forbids more than one wife and live more or less happily with several wives in the same household.

SLAVERY IN WESTERN ABYSSINIA.

In respect to polygamy's monster twin, namely, slavery, many of the Abyssinians are quite ready themselves

to capture slaves from the inferior and more lowly developed tribes as well as to hold them in slavery when caught by some one else. Theoretically, there is no slave trade in Abyssinia, and in fact it is pretty well controlled. In the region which I traversed, where no whites had preceded me, there were still one or two slave markets, and I rather expected to see the trade going on openly; but Menelek's lieutenants know that he has engaged with European powers to put down the slave trade. They were therefore surprised that I had been permitted to enter that part of the kingdom where the traffic is still maintained.

When I asked where I could buy two or three boys, one of the chiefs, who had escorted me for several days, good naturedly said, "You white people have stopped that, but," he said, "there are robbers from whom you may buy on the sly," and indeed at Wombera a small boy was offered at my tent for 37 Maria Theresa dollars, equivalent to about half that sum in our money.

There were, however, no public offerings, although I chanced upon the market day, but the chiefs had, so my interpreter informed me, given orders that no public traffic should take place.

Indeed the presence of a white man on the market ground stampeded the whole performance, not through fear, but through curiosity. There were perhaps three or four hundred people gathered together for bartering, and the whole of them—the last man, woman, and child—arose and followed and pressed upon myself and assistant as we walked about, but apparently with no ill-humor.

The night before the natives had refused to sell us food, but finding no harm come of our presence they changed their tactics and I was able to obtain one chicken and twelve eggs for three blue beads. Eggs are not eaten by the natives. Careful inspection of their stores is therefore necessary.

The next day we met a long caravan of slaves marching up from the country south of the Nile. The caravan seemed to belong to a rather striking-looking woman, who was the wife of a great Abyssinian personage dwelling far to the north. She and her lieutenants had been in Shankali Land and had obtained (by purchase, let us presume) a goodly number of black fellows. These are offered for sale by some bold neighbor or relative. Where these slaves were seen by me in service around Monkorer, which is a considerable town, and in the smaller villages westward, there was nothing of brutality or special hardship of any kind apparent in their surroundings.

We passed through a section of country not yet thoroughly subdued by the Abyssinians and inhabited sparsely by the very people from whom the slaves were drawn. How far these very low savages prefer the debasement in which nature holds them when free to the conditions created for them by superior masters, I cannot state. The fact is that a wide gap exists between them and their Abyssinian lords, and that the physical surrounding of the Shankali when with the Abyssinian, crude as all that surrounding may seem to us, is far less crude than that which he creates for himself.

Those who finally accept the sovereignty of the Abyssinian are not subject to slave-raiding, but are permitted to live peaceably enough in their own fashion at the expense of some small tribute to the Abyssinian lord.

The dominion of the Abyssinian power is now established as far west as Wombera, where I left the most westerly Abyssinian post and descended to the Nile plains below.

The whole region beyond has been terribly swept by war and slave-trading. It is yet without government, although there is a merely nominal sovereignty claimed by Menelek. As a matter of

fact, each village—and there were two—seemed to stand entirely alone. The people hid away from before my small caravan, and I had very great difficulty in obtaining guides. While in Abyssinian territory these guides had been impressed by force or blows when necessary and at the command of the Abyssinian dignitary who accompanied me.

When I wanted to descend to the gorge of the Nile, the fine old gentleman, who was chief of the region, ordered some of the local natives, Agaa by name, armed only with spears, to go down with me, his own soldiers somehow not wanting to make the venture.

The river bottoms were said to be filled with warlike Shankali, armed with spears and poisoned arrows, and who had been forced to these narrow confines by lack of food, as along the river they could get an occasional hippopotamus and live upon that for a long time. My native escort was absolutely cowardly and got into a blue funk over the few footprints that appeared near the river, and I had to promise to protect them with four of my own men, but insisted that they should show us the way. The Shankali appeared only on the far side of the river, just a few black, naked fellows, who made a great pow-wow, and were evidently wholly unequal to the task of attacking four or five rifles and six or eight spears. Moreover, they were paralyzed, as in every other case in which I met such low people, by the sight of white men.

One village chief, after getting his people around my camp in such numbers as to worry my followers somewhat, but in wholly insufficient numbers to have made any successful trouble with my whole body, which consisted of eighteen well-armed men, finally came down in utmost submission and declared, as nearly as I could make out from the five interpreters arranged in tandem, that I was a god and could eat him up if I chose.

This middle territory will soon be assigned in part to Abyssinia and in part to the Sudan. That part assigned to the Sudanese authority, which means the British, will soon have some new life built out of the remains of a devastation as complete as anything imaginable. The Abyssinian portion will live along its barbaric fashion with some small development.

The status of the black and naked Shankali will be slightly raised, and at least the country will be so well ordered by the power of Abyssinian soldiers that further investigation by white men may in the future be easily carried on there.

But the Abyssinian himself is not, in my judgment, ready for civilization as we measure civilization, though the upper classes already have much of the manner of the polished eastern people without having the material richness that Asiatic civilizations have produced.

The Abyssinian is individually rather an independent, easy-living, battle-loving, raw-meat-eating, sensual, devil-may-care chap; but one must guard against giving any definition or description which shall be taken as universal in its application. This is rendered particularly inappropriate when one recalls the varying types from the well-chiseled Arabic and Jewish down to the coarse negroid caused by all degrees of miscegenation.

Their laziness, their fondness for *backsheesh*, their inaccuracy, and their pride, puffed up by the defeat of the Italians; their ignorance of what we know to be our immense superiority—all this for a time irritates the traveler, but in the end there is left rather a pleasant impression of kindness.

As is generally the case, the Abyssinians who have seen most of Europeans are not those whom Europeans would like most to see.

I should be quite willing to trade with bars of salt, which constitute the chief currency from Addis Abeba westward:

northward, and southward, or with beads or with empty tin cans, all of which served my purpose in various places, rather than to have the convenience of using the Maria Theresa or the Menelek dollar, which coins are now quite readily taken along the caravan routes from Addis Abeba to the east.

Rather this inconvenience of crude methods, with the greater simplicity and straightforwardness of the untutored native, than the coarse cunning which begins to appear when the native begins to suspect and compete with the superiority of the white man and to truckle only to one thing, namely, *backsheesh*.

THE FUTURE OF ABYSSINIA.

Today Menelek and the Sultan of Morocco control the only two territories independent of actual occupation or diplomatic claim on the part of some European power. As between these powers, this division has been made without bloodshed, and is a notable triumph for diplomacy; and I believe that the European domination of African territories may be counted as blessed, for certainly those territories which have passed beyond the first paroxysms of savage resistance now show larger and more comfortable populations than existed under native rule and misrule. This is not set forth as an apology for the grasping of territories held by lower races, since our ethical standard is not well enough determined for application to these cases, and since, moreover, the grasping continues to take place, whether we count it as right or wrong.

The ultimate determination of the Abyssinian and Morocco territories will put a much more severe strain upon diplomacy than it has yet been called upon to bear in regard to African affairs. The population now in occupancy of the territory is in both cases far above the average of African intelligence, and in one case community of religious form with European countries will tend to complicate the situation, in that the missionary cannot appear so opportunely as a *casus belli*. However, to overcome that difficulty, we may convince ourselves that the Christianity of the Abyssinians is not quite the correct style, and may thus approximate this case to others in which the itching palm is stretched forth as if in prayer.

Here again let me say that it is not my desire to criticise missionary methods. To me, believing, as I do, that the universe is absolutely law-ordered, even to the lifting of a finger, the blood-thirsty missionary appears to be as solemn and as necessary a part of the scheme of the universe as any other part.

Quite as convenient, perhaps even more so, than the missionary as a *casus belli* is the railway—that is, the railway of civilized man laid in barbarian country. Not only may it furnish the cause of war, but it, of course, immensely simplifies the problem of carrying out the war which it may have produced. While the French, together with the English, Italians, and Russians—the four nations which have sent emissaries to Menelek—are doubtless of the firm conviction that this is not the time for war-making, that the enlightened peace of Menelek serves best all purposes which can now be served, it remains that when disorders of any sort arise, if the railway may have then been completed up to the top of the Abyssinian plateau, the French will have obtained a very great advantage for the playing of such part as they may then choose.

An extension of the British-Egyptian Railway up the Nile, now stopping at Khartum, may be made without great difficulty along the route which I followed, and which I pointed out in a paper about to appear in the Journal of the Royal Geographical Society of London. Such extension would practically equate advantages in respect to transpor-

tation, if we consider only a contest between either France or England on the one side and Abyssinia on the other; but if these great Powers were themselves at war, then the naval supremacy of England, operating from a great fortified sub-base such as Aden, would probably control and paralyze the Jibuti terminal of the French railway.

But taxed as is Great Britain now, it does not seem probable that this 500-mile extension will be undertaken at a very early date. So far as the peace of the civilized world and the continued independence of the Abyssinian are concerned, it seems probable that a continuation of the state of unpreparedness on the part both of France and England should serve best these ends of peace. To subsequently maintain at about equal point of advantage the facility which either of these great nations might have for making war upon, with, or through the Abyssinians would prolong the national life of this interesting people, who occupy in barbaric style one of those splendid stretches of the earth's surface which must ever tempt the daring European, driven forth as he is by a blind racial instinct—driven forth to combat and to push away the specter that Malthus raised.

Could you have been with me in marching over the devastation marking the as yet unconquered Bollasa region into the Sudan, where only a few months before the blood of the dying calipha had cemented the foundations of peace; could you have seen there the small but happy beginnings of well-ordered villages and the contented submission of these black and wayward children of the desert and their obedience to the firm, wise rule of the English officer, recalling the unchanging story of almost unending tribal war, you would feel very nearly convinced that, if indeed peace and order be good for the lowly developed peoples of the world, this good will be earliest attained by the sacrifice to some such great policing power as Great Britain of an independence which ever has meant native tyranny.

But we must remember also that disasters which read terror into our blood but furnish in part the needed excitement to give some value to the crustacean lives of these rude people.

Passing one day through the ruins of a village marked by broken pottery vessels and grinding-stones, my grinning guide explained that here he had lived some few years ago; the village had been attacked by Mahdists or slave-traders, he seemed scarcely to know or care which, and he had lost his hut, three wives, and one or two children, himself escaping into the close-pressing bush. "But," said he, with the philosophy which made me poor in his comparison, "I now have another hut, other wives, and other children," and he laughed good-naturedly. Absolutely the only care at that time in the mind of this simple savage was a desire to get loose from the caravan in order that he might return to the hulk of a hippopotamus which I had shot two days before. Could he but secure that black carcass for himself and his small village, life would have no other cares—today, tomorrow, and even next week would be provided for. Could more be asked of Heaven?

THE OLD YUMA TRAIL

By W J McGee

SOME three to seven centuries before Columbus, the country lying south of Gila River, west of the Sierra Madre, and east of the Californian Gulf was occupied by an agricultural people, and the ruins of their villages, the remains of their irrigation works, and the crumbling fortifications of their places of refuge on adjacent hilltops—mute witnesses of the rise and passing of a people—still survive in numbers. The finely wrought fictile ware, shapely stone implements, and obsidian blades from the ruins betoken the culture commonly known as Aztecan or Mexican, or better as Nahuatlan. The location and extent of the house remains, as well as the traces of great acequias, betoken irrigation systems more extensive and successful than those of the Mexicans or Americans of today. The vestiges of temples and plazas combine with the symbolic decoration of the pottery to betoken a complex social organization resting on a religious basis, while the corrals (each with its water hole) in many of the villages, together with some of the pictographs carved on neighboring cliffs, suggest, if they do not attest, that a llama-like animal, the coyote, the turkey, and perhaps other creatures, were domesticated by the villagers. The entrenched refuges ("las trincheras" of the modern Mexicans) are among various indications that the peaceful, pastoral folk were displaced and nearly destroyed by a predatory foe whose ruthless energies were directed against irrigation works as well as against families, farms, and flocks, and the testimony of the ruins is supported by the traditions of surviving tribes, which point to the marauding Apache as the spoilsman—and hence the hereditary enemy—of the plains people. During this early agricultural period the scant waters of the region were where they are now, and were probably little, if any, more abundant than today, though better conserved and distributed by means of represos and low-gradient acequias. The village sites were those selected long after for aboriginal and Mexican pueblos, with a few others never again occupied, while the trails and roads, as they were by watering places and impassable sierras, must have followed lines corresponding with those of later travel. Among the natural routes fixed by water and mountain, and still marked by ruins and smaller relics, was that which long after became the Yuma trail.

THE TIME OF TRADITION.

The ancient lore and modern customs of the Papago Indians tell of descent from the prehistoric irrigators—tell that their tribal ancestors were among the few survivors of the prehistoric pastoral folk who, driven into the deserts too far for foes to follow, were able to adjust themselves to one of the hardest environments in America, to engage in a ceaseless chase for water singularly like the chase for quarry in lower culture, and to produce a unique combination of crop-growing industries with migratory habits.

One of the earliest havens of the ancestral exiles was a meager oasis already occupied by some of them, though divided from the customary Apache range by a hundred miles of waterless desert; here a tiny rivulet, fed by the subterranean seepage from rugged granite

ranges on north and south, trickles permanently over the sands of a broad wash occasionally swept by the freshets following storms in the same mountains; here the refugees began anew the development of tribal character; and here began their unwritten Book of Leviticus, following their Genesis and Exodus in curiously Hebraic order, in their Ancient Sacred Tales. Devotees (like other lowly folk) to the dark mysteries of unstudied nature, they had brought their old faith with them, but enshrined it anew in their second Eden; carrying a cult of the sea—a vestige of littoral life in earlier generations—in which they worshipped the ocean as the infinitely potent Mother of Waters, and finding their faith sharpened fearsomely by the incomparable preciousness of fluid in these outer deserts, they enjoined on their young men pilgrimages to the Gulf at its nearest point as sacramental requisites for entering into the stage and condition of full manhood; bringing seed of maize and beans from ancestral gardens, they not only planted but cherished their crops with a consuming watchfulness growing into actual worship, and finally giving name to both locality and tribe—for oasis and river came to be known as the Place of Corn (Sonoyta, as commonly written), and the tribe as Beans People (papahoaatam).* The habit of eternal vigilance on the part of the Papago of defense or flight, according to the strength of invading parties, led to the placing of outposts as far east of Sonoyta and as near to the Apache range as might be; and eventually a semi-symbolic outpost was established at the most conspicuous and impressive landmark of all Papagueria—Baboquivari Peak. This station was supported partly by shamans armed with magical devices, partly by bold and athletic warriors who could be trusted to traverse the hundred miles of desert to Sonoyta between noon-day suns; and there is traditional evidence that the granite walls of the peak—so lofty and precipitous that but one Caucasian* has scaled them—were climbed and its crest occupied by at least one party of tribesmen. In time Baboquivari became the Sacred Mount of all the Papago; and as the tribe multiplied and flowed feebly back toward the ancestral valleys, the sacramental pilgrimage of the young men was so extended as to cover the 150 miles from Baboquivari to the sea, with Sonoyta as a way station.

A half of the path thus trodden by the Papago pilgrims from some centuries before Columbus up to the beginning of the twentieth century was that retrodden by Caucasians for a century and a third as the Yuma trail.

THE COMING OF THE CAUCASIAN.

The first foreigners to approach the ancient trail were Alvar Nuñez Cabeza de Vaca and his companions (in all, three whites and one black), as they near the end of the most remarkable transcontinental journey in the history of America, in the spring of 1536; three or four years later Coronado's army also approached and perhaps crossed within sight of Baboquivari, and it is practically certain that a detachment of this army actually followed the footsteps and guidance of the Papago pilgrims over a part of the trail. It was in September, 1540, that Captain Melchior Diaz set out from Coronado's headquarters at Corazones (at or near the site of the present Ures) with a force of 25 men in the hope of intercepting Alarçon's fleet on the coast, and so shaped his course as to strike Rio Colorado a little way above its mouth. His route was never mapped, nor even fully described (he lost his life through an accident in the Colorado country); but to one who has traversed the region

* Cf. "Papagueria," THE NATIONAL GEOGRAPHIC MAGAZINE, vol. IX, 1898, p. 345.

* Prof. R. H. Forbes, of the Territorial University of Arizona.

in several directions, sifted the local lore of waterpockets in the rocks and coyote-holes in the sandwashes, and traced the routes of both prehistoric and present travel, it seems clear that Diaz' detachment worked northwestward to the Horcacitas and on to Rio San Ignacio, and thence across the plains to Sonoyta, where he must have watered and rested before pushing forward by way of the high waterpockets (Tinajas Altas) to the great "River of Good Guidance" (Rio de Bono Guia, an early name of the Colorado); and it must have been by the same route that the leaderless party returned in January, 1541.

With this expedition the third chapter in the history of the Yuma trail ends abruptly; for, through the most astounding blunder of American geography, the memory of Diaz and the records of Alarcon and his predecessor, Ulloa, dropped out of mind for more than a century and a half, during which the Californias were mapped as a great island in the Pacific.

THE JESUITS AND THEIR SUCCESSORS.

Toward the close of the seventeenth century the era of Jesuit missionizing in Papagueria opened, and not long after Padre Kino and his colleagues struck the tribesmen's trail from Baboquivari to Sonoyta; and it was in 1701 that Kino pushed westward, necessarily by way of Tinajas Altas (which he was the first to map), and rediscovered Rio Colorado, thereby puncturing the bubble of fictitious geography.

The good padres were ideal pioneers; wherever the Indian trails led, there they followed; and wherever an Indian settlement was found, there they erected crosses and sought converts. To them the Place of Corn on the slender rivulet was a fertile field. Some fifteen miles down the sandwash from the principal village they found a smaller settlement gathered about a spring of whitish water seeping from potash-bearing granites, for which they adopted the native name House-ring Spring* (Quitobac), and they set their wooden cross midway between the two settlements and called the place Santo Domingo.

As missionizing proceeded, routes of travel were opened from tribe-range to tribe-range; and in the course of a few decades the hard trail from Culiacan (or Ures, or Chihuahua, or Fronteras) to Santo Domingo, and thence to the Yuma country on the Colorado and on to the missions of California, became an established route of travel and communication. The palmiest days of the Yuma trail rose and set in the century 1740–1840. It was trodden by adventurers too poor to ride, yet too plucky to stay; it was beaten by hoofs bearing churchly equipage and royal commissions and vice-regal reports too precious to be entrusted to the crude craft then plying the Pacific; it was furrowed by the huge hewn-log wheels of Mexican carts carrying families a few miles a day, and later by the iron tires of prairie schooners and primitive stages; its borders were trampled by stock driven out to enrich the distant province of Alta California; and its course was marked by the pitiful milestones of solitary graves, each with its cruciform heap of pebbles. During this period the hard route was dubbed "El Camino del Diablo;" and it formed (alternatively with the easier but much

* The typical Papago house is of hemispherical shape and made of grass thatch attached to a framework of mesquite saplings and akatilla stems; it is called *ki* or *key*. The first stage in building is the erection of a first course of thatch in the form of a vertical ring 12 or 15 feet in diameter; this may be occupied for weeks or months before the upper courses are added to complete the walls and forming the roof; it is called *ki-to*. *Bac* is one of several Papago terms for water or watering place, and is applied specifically to springs. When the missionaries found a larger Papago settlement about a series of mineral springs 30 miles south of Sonoyta, also called Quitobac, they applied a Spanish diminutive to the first found village, and ever since it has been known as Quitobaquito.

longer route by way of Tubac and Tucson) the main overland tributary to "El Camino Real"—The Royal Highway of California.

The Jesuits were expelled in 1767; but the old Yuma trail and the old California missions remained as monuments to their enterprise and as means of later progress.

With the international friction presaging the Mexican war, the importance of the ancient trail began to wane; with the treaty of Guadalupe Hidalgo in 1848 our own argonauts cast their eyes toward the far-rumored overland route, and with the gold fever of Forty-nine the activity along the fitly named Camino del Diablo waxed again temporarily. The sharing of its miseries by American and Mexican adventurers begot sympathy and mutual understanding, and opened enduring friendships which helped to heal the international breach and obliterate the scars of warfare. Yet the transitional epoch was not without painful episodes; the Crabb filibustering expedition struck the historic trail on their way *via* Sonoyta, to be annihilated at Caborca (where the old church still bears bullet-marks of the battle); tradition tells of an immigrant colony from Mexico to California following the ancient way to Tinajas Altas, where they were halted by an evil conjunction of epidemic with international complications to fill literal scores of graves still dotting the barren footslopes of the dazzling sierra; and equally stirring events still live in the memories of all older Arizonians and Sonorenses.

It was during the gold-fever renaissance that the death-roll of El Camino del Diablo became most appalling, for many of the travelers were fresh from humid lands, knew naught of the deceptive mirage or the ever-hovering thirst-craze of the desert, and pressed out on the sand wastes without needful preparation. The roll will never be written in full, since most of the unfortunates left no records, scores leaving no sign save bleaching bones; but observers estimate that there were 400 victims of thirst between Altar and Yuma within eight years, an estimate which so conservative a traveler as Captain Gaillard thought fair after he had "counted sixty-five graves in a single day's ride of a little over thirty miles."

THE BOUNDARY SURVEYS.

With the Gadsden purchase of 1853, the boundary surveys already under way received fresh impetus, while the belated argonauts still trying all possible paths toward the new territory, whose name was synonymous with gold for a generation, were once more tempted southward. So, even before the survey reports were published the fame of the route spread widely; stories of hard marches over the malpais stretching out from the volcano of Pinacate, of the miring of outfits in the bottomless mud of Tule valley in springtime, of wagons clogged in shifting sands, of desperate night marches under the sharp goads of thirst and hunger, of rescues of thirst-crazed waifs, of burials of the bodies and distributions of the goods of less fortunate parties—these and other heart-rending recitals were whispered afar, or penned in friendly letters, to color the lore of America's most energetic pioneering and filter meagerly (far too meagerly for full history) into literature. The ill-repute of the trail gradually diverted the overland travel to more northerly routes, and when the Southern Pacific Railway pushed over the arid zone in the seventies the old route was finally deserted, save by Papago pilgrims in the sacramental journeys still pursued, and by rare prospectors or hunters.

The final chapter in the history of the Yuma trail touches only the retraversing of the route (after sixteen years without the passage of a vehicle) by the International Boundary Commission of

1891–1896, and the erection of the most serviceable series of international boundary monuments on the western hemisphere—massive pillars of cast iron or solid pyramids of cement-laid stone—each so located that the next monument and the intervening country in either direction can be seen from its site, while the position of each is established with respect to neighboring natural features by published photographs. The boundary party was of men well known throughout both countries; the American commissioners, Colonel Barlow, Captain Gaillard, and Astronomer Mosman, like the naturalist, Dr. Mearns, were chosen on account of previous achievements, while the Mexican commissioners, Señores Blanco, Gama, and Puga, were equally eminent representatives of the sister republic. A report worthy to serve as a model for future commissions, accompanied by an ample atlas and a portfolio of photo-mechanically faithful portraits of the plains and mountains intersected by the boundary, has been published within a few months, while one of the clearest pictures of the arid region ever drawn is Captain Gaillard's "Perils and Wonders of a True Desert."*

The wheel ruts and mule tracks left by the party seven years ago are still plain along the trail, save where obliterated by sand-drifts; even the tent-pegs, ash-heaps, half rusted cans, and empty pickle bottles still attest the arduous work and frugal fare of the commissioners and their colaborers; for one of the characteristics of the desert is the extreme sluggishness of surface-changing processes, a sluggishness hard to realize by those who dwell in humid lands.

After the passing of the boundary parties, the old trail remained untrodden from Quitobaquito westward, except by a road supervisor erecting guide-posts in the portion lying within Yuma County, and by three horsemen (an American, a Mexican, and an Indian) in other portions, until November, 1900, when it was struck by an expedition of the Bureau of American Ethnology.

Such, in brief, is the history of one of the most striking and picturesque routes of travel on the continent. Trodden first in a prehistoric period known only through crumbling ruins, then followed for half a millennium or more in votive journeys of Papago tribesmen—the Bedouin of America—it was traced by Spaniards long before the landings on James' island and on Plymouth Rock. Adopted by evangelists two centuries ago, it soon became a line of pioneering, a highway of colonization, an artery of royal communication; next it was thronged by the indomitable army of argonauts on their way to open a new world on the shores of the Pacific, and later it lapsed into utter desert, than which there is none more forbidding in America.

*The Cosmopolitan, October, 1896, pp. 592–605.

To be concluded in the April number.

THE SEA FOGS OF SAN FRANCISCO*

FROM May to September little rain falls in San Francisco, but every afternoon great banks of fog march in from the Pacific and enwrap the houses, streets, and hills in their dense folds. Ocean fogs as a rule form when cool air flows over warm moist surfaces ; but in the case of the San Francisco sea fogs these conditions are reversed, for the ocean surface temperature is 55° Fahrenheit, while the air temperature may reach 80°. Another explanation, therefore, of the cause of these fogs must be sought.

A glance at the map (not reproduced) shows how ocean, bay, mountain, and foothills are crowded together. East of San Francisco stretches a valley 450 miles long and 50 miles wide and level as a table. In this valley the afternoon temperature in summer is usually 100° or over. The valley is connected by a narrow water passage, the Golden Gate, with the Pacific Ocean, the mean temperature of whose waters is in this locality about 55°. Thus within a distance of 50 miles in a horizontal direction there is frequently a difference of 50 degrees in temperature. At the same time in a vertical direction there is often a difference of 30 degrees in an elevation of half a mile. Well-marked air currents, drafts, and counter-drafts are therefore prevalent

The prevailing surface air currents at this season of the year are strong westerly currents, but high bluffs, ridges, and headlands intercept these winds at such an angle that they are diverted to and pour through the Golden Gate with greatly increased velocity. The result is that both air and water vapor are piled up at this point. Mr. McAdie therefore concludes that the summer afternoon fogs of the San Francisco Bay region are probably due to mixture, rather than to radiation or expansion. They are the result of sharp temperature contrasts at the boundaries of air currents having different temperatures, humidities, and velocities. In originating and directing these air currents the peculiar contours of the land also play an important part.

The fog outside the Heads may extend over an area 10 miles square and reaches to a height of about half a mile. If it were solidly packed its bulk would thus be 50 cubic miles. As a cubic foot of the fog at its average dew-point temperature, 51° F., weighs 4.222 grains, a fair estimate of its total weight, allowing for wide swaths or channels fog free, is 1,000,000 tons. This immense volume is carried through the Golden Gate by westerly winds blowing 22 miles an hour, from 1 to 5 p. m. on summer afternoons.

The United States Weather Bureau maintains a station on Mt. Tamalpais, which is about half a mile above sea-level and thus above the fog, another in the city of San Francisco, where the fog converges, and a third station at Point Reyes, the center of origin of the fog. Mt. Tamalpais is about 25 miles from Point Reyes and 10 miles from San Francisco.

The differences in the temperature and humidity of these three stations is most marked. The highest temperature recorded on the mountain during the year 1899 was 96°, on July 18; the maximum temperature on the same day at San Francisco was 66°, and at Point Reyes 52°. That is, on the mountain it was 30 degrees hotter than in the city and 44 degrees hotter than at Point Reyes. The mean annual temperature of the three stations is, however, about the same for all, 55°, which is also the

*An abstract of a paper contributed to the *Monthly Weather Review* for November, 1900, by Alexander G. McAdie, forecast official of the U. S. Weather Bureau at San Francisco.

Figure 1.—Morning Fog over Valleys.

View from U. S. Weather Bureau Observatory, Mount Tamalpais.

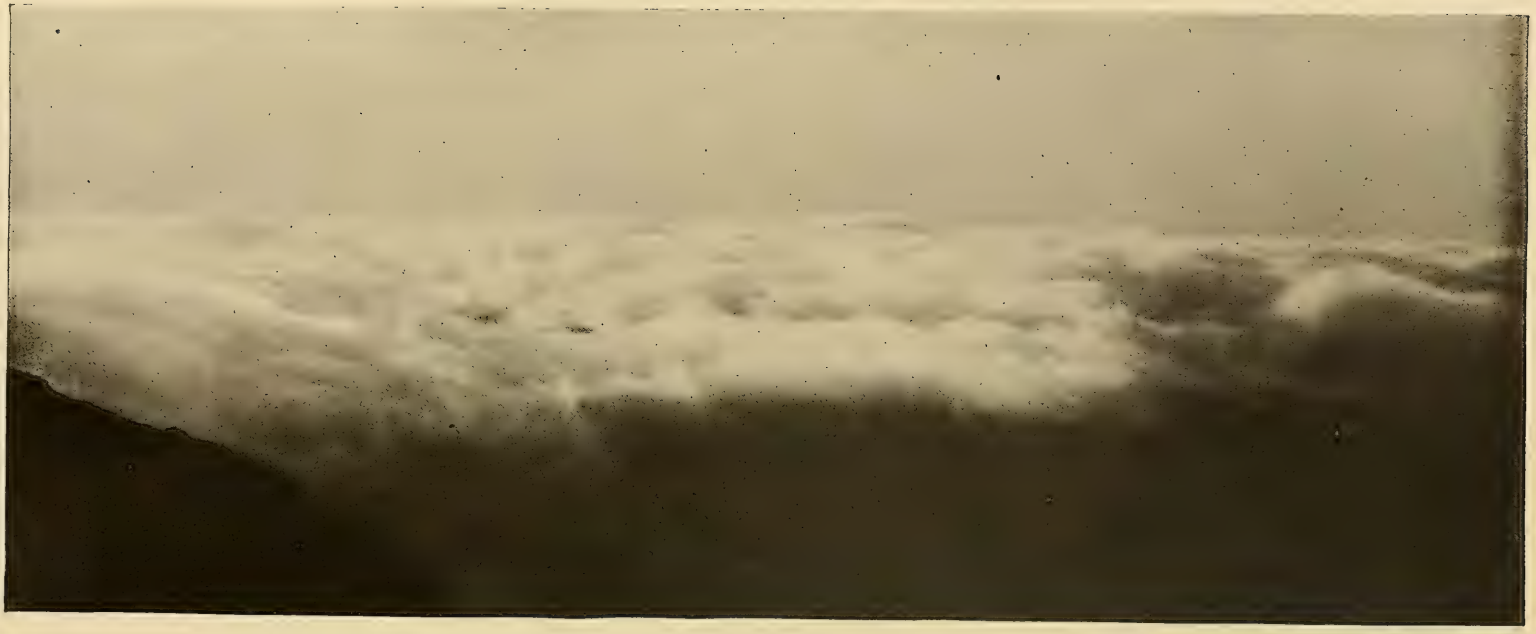


Figure 2.—Lifted Fog. Height above ground about 500 meters.

View from U. S. Weather Bureau Observatory, Mount Tamalpais.

Figure 3.—Summer Sea Fog pouring over Sausalito Hills and through Golden Gate.

Figure 4.—Fog Waves.

View from U. S. Weather Bureau Observatory, Mount Tamalpais.

Figure 5.—Fog Billow.

View from U. S. Weather Bureau Observatory, Mount Tamalpais.

mean annual temperature of the ocean in the vicinity of the city. During the summer months, owing to the fog, there is usually a cooling of at least 11 degrees at the lower stations; but in winter naturally these conditions are reversed, the temperature near the sea remaining higher than on the mountain. The mean relative humidity at the station on Mt. Tamalpais was 59 per cent, while that at San Francisco was as high as 83 per cent. The average hourly wind velocity for the higher station is also much greater than that of the lower station, the maximum velocities recorded being respectively 91 and 47, and about this proportion is maintained throughout the year.

The Weather Bureau officials in the city receive frequent reports from Point Reyes and Mt. Tamalpais, and thus are able to issue a daily chart showing the extent and character of the sea fog over Drakes Bay, the roadstead, and the Golden Gate.

From Mt. Tamalpais Mr. McAdie has made a special study of fog conditions. His method of obtaining a cross-section of the fog is very ingenious. A descent from the station to sea-level can be made by the train in about fifty minutes, a distance of eight miles. A kite meteorograph is attached near the top of an open-canopied car, insuring good circulation, and carried through the fog in this way a number of times. From the data thus obtained, a rough cross-section is made. A typical pressure distribution accompanying sea fogs has been recognized. In general, a movement southward along the coast of an area of high pressure in summer means fresh northerly winds and high temperatures in the interior of the State, with brisk westerly winds laden with fog on the coast.

The illustrations that accompany this paper depict very graphically the splendor of fog effects. Figure 1 shows the morning fog covering the valleys—the most common type of fog. Figure 2 shows a mass of lifted sea fog in a state of comparative rest. Figure 3 shows the summer sea fog pouring in a mighty torrent through the Golden Gate and submerging the neighboring hills. Figures 4 and 5 show the great billows of the wind-driven sea of fog.

To Prof. Cleveland Abbe, editor of the *Monthly Weather Review*, and to Mr. Alexander G. McAdie, of San Francisco, the NATIONAL GEOGRAPHIC MAGAZINE is indebted for the photographs.

GEOGRAPHIC FACTS FROM REPORT OF THE TAFT PHILIPPINE COMMISSION

THE total amount of land in the Philippine Islands is approximately 73,345,415 acres. Of this amount it is estimated that about 4,940,000 acres are owned by individuals, leaving in public lands 68,405,415 acres.* The land has not been surveyed, and these are merely estimates. Of the public lands, there is about twice or three times as much forest land as there is waste land. The land is most fertile and for the greater part naturally irrigated. There was a very great demand for this land, but owing to the irregularities, frauds, and delays in the Spanish system, the natives generally abandoned efforts to secure a good title, and contented themselves with remaining

*The religious orders own about 400,000 acres.

on the land as simple squatters, subject to eviction by the State. In 1894 the Minister for the Colonies reported to the Queen of Spain that there were about 200,000 squatters on the public lands, but it is thought by employees in the forestry bureau, who have been in a position to know, that there are fully double that number. In the various islands of the archipelago the proportion of private land to public land is about as stated above, except in Mindanao, Mindoro, and Palawan, where the proportion of public land is far greater.

The insufficient character of the public-land system under the Spanish Government in these islands makes it unnecessary to refer in detail to what that system was. As there were no surveys of any importance whatever, the first thing to be done in establishing a public-land system is to have the public lands accurately surveyed. This is a work of years, but it is thought that a system of the laws of public lands can be inaugurated without waiting until the survey is completed. Large amounts of American capital are only awaiting the opportunity to invest in the rich agricultural field which may here be developed. In view of the decision that the military government has no power to part with the public land belonging to the United States, and that that power rests alone in Congress, it becomes very essential, to assist the development of these islands and their prosperity, that Congressional authority be vested in the government of the islands to adopt a proper public-land system, and to sell the land upon proper terms.

MINERAL WEALTH AND THE MINING INDUSTRY.

It is difficult at the present time to make any accurate general statement as regards the mineral resources of the Philippine Islands. There has never been any mining, properly so called, in this archipelago up to the present time. The mining fields have never been thoroughly prospected, and even where very valuable deposits were known to exist they were worked, if at all, in a haphazard and intermittent fashion.

Present indications are that the near future will bring a great change in the mining industry. According to the chief of the mining bureau there are now some twelve hundred prospectors and practical miners scattered through the different islands of the archipelago. Of these probably 90 per cent are Americans. They are for the most part men of good character. They are pushing their way into the more inaccessible regions, furnishing their own protection, and doing prospecting of a sort and to an extent never before paralleled in the history of the Philippine Islands. The result is that our knowledge of the mineral resources of the group is rapidly increasing. When all due allowance is made for prospectors' exaggerations, it is not too much to say that the work thus far done has demonstrated the existence of many valuable mineral fields. The provinces of Benguet, Lepanto, and Bontoc in particular form a district of very great richness.

In the province of Lepanto, at Mancayan and Suyoc, there are immense deposits of gray copper and copper sulphide, and running through this ore are veins of gold-bearing quartz, which is more or less disintegrated and in places is extremely rich. This copper ore has been assayed, and the claim is made that it runs on the average 8 per cent copper, while gold is often present in considerable quantities. The deposits are so extensive as to seem almost inexhaustible.

The Commission has been unable to verify the statements as to the extent and richness of these copper deposits through its own agents, but the authority for them is such that they are believed to be substantially correct.

As early as 1856–'57 two concessions were granted to the Cantabro Philippine Mining Company, and an attempt was made to exploit them and market their product. Rude methods of mining, ruder methods of extracting the metal, and still more rude and primitive methods of transportation, combined with lack of sufficient capital and suitable labor, led to the abandonment of this attempt, and for more than twenty years the property, which in itself is a small claim upon the immense ledge above referred to, has been occupied only to the limited extent required by the Spanish mining laws to prevent the cancellation of the concession. The officer at present in charge of the mining bureau characterizes this deposit as an "undoubted bonanza." The main thing necessary for its exploitation is the opening up of a short line of communication with the coast.

Lignites are known to exist in Luzon, Bataan (the island, not the province), Mindoro, Masbate, Negros, Cebú, Mindanao, and other islands. Some of the deposits are very extensive. As yet they have been worked only at or near the surface.

Testimony is unanimous to the fact that the Philippine coals do not clinker, nor do they soil the boiler tubes to any such extent as do Japanese and Australian coals.

The extensive fields near Bulacacao, in southern Mindoro, are within four to six miles of a harbor which gives safe anchorage throughout the year and which has water deep enough for the largest ocean-going vessels. Some of the Cebú deposits are also conveniently situated with reference to harbor facilities. It is to be confidently expected that the coal will play a very important part in the future development of the archipelago.

The outlook as to gold mines grows more favorable as the operations of prospectors are extended. Modern gold-mining machinery has never been used in the Philippines. Igorrote miners in the Benguet-Lepanto-Bontoc district discard all rock in which there is not visible a considerable quantity of free gold. Prospectors in this region claim to have located very extensive deposits of low-grade, free-milling ore, which will yield large and certain returns as soon as concessions can be secured and machinery put in place. Unless the statements of those who have been working in this region are utterly false, it is true that very valuable deposits have been located, and that extensive operations will be undertaken as soon as claims can be granted and machinery placed. At all events, it is certain that the men who have located these deposits have sufficient faith in them to camp on them and wait month after month for the time to come when they can establish their claims.

Extensive deposits of high-grade iron ore are known to exist, but it would seem that their development must be preceded by the development of the coal fields.

But before any of the mineral resources of the islands can be developed mining laws must be enacted and existing claims settled.

HARBORS AND HIGHWAYS.

As may have been expected, centers of population and comparative wealth are to be found at the seaports and territories contiguous thereto, which are more or less accessible to markets by means of water communication; but these favored localities are limited in area and their facilities for doing business are, with few exceptions, inadequate and unsatisfactory.

Although there are numerous harbors dotting the coast line, there are but few that admit vessels of heavy draft. As a rule, they are not landlocked, and are more or less exposed to the pre-

vailing typhoons, so that there are frequently days, and even weeks during which ships can neither load nor unload.

Large vessels entering the harbor of Manila, having a draft of more than 16 feet, are now compelled to lie two miles or more offshore. Those of less draft than this find entrance into the Pasig River. The bay is so large that it feels the full effects of the winds. The only method by which large vessels anchoring therein can take on or discharge cargo is by lightering. At best, and when the bay is calm, this is a tedious and very expensive process, and during rough weather becomes impossible. Moreover, during the prevalence of typhoons, which are not infrequent, the safety of vessels thus situated is much endangered.

The cost of doing business in this port is very great and constitutes a very heavy burden upon commerce. Freight rates from Manila to Hongkong, a distance of about 700 miles only, are as much and sometimes more than from San Francisco to Hongkong, a distance of about 8,000 miles.

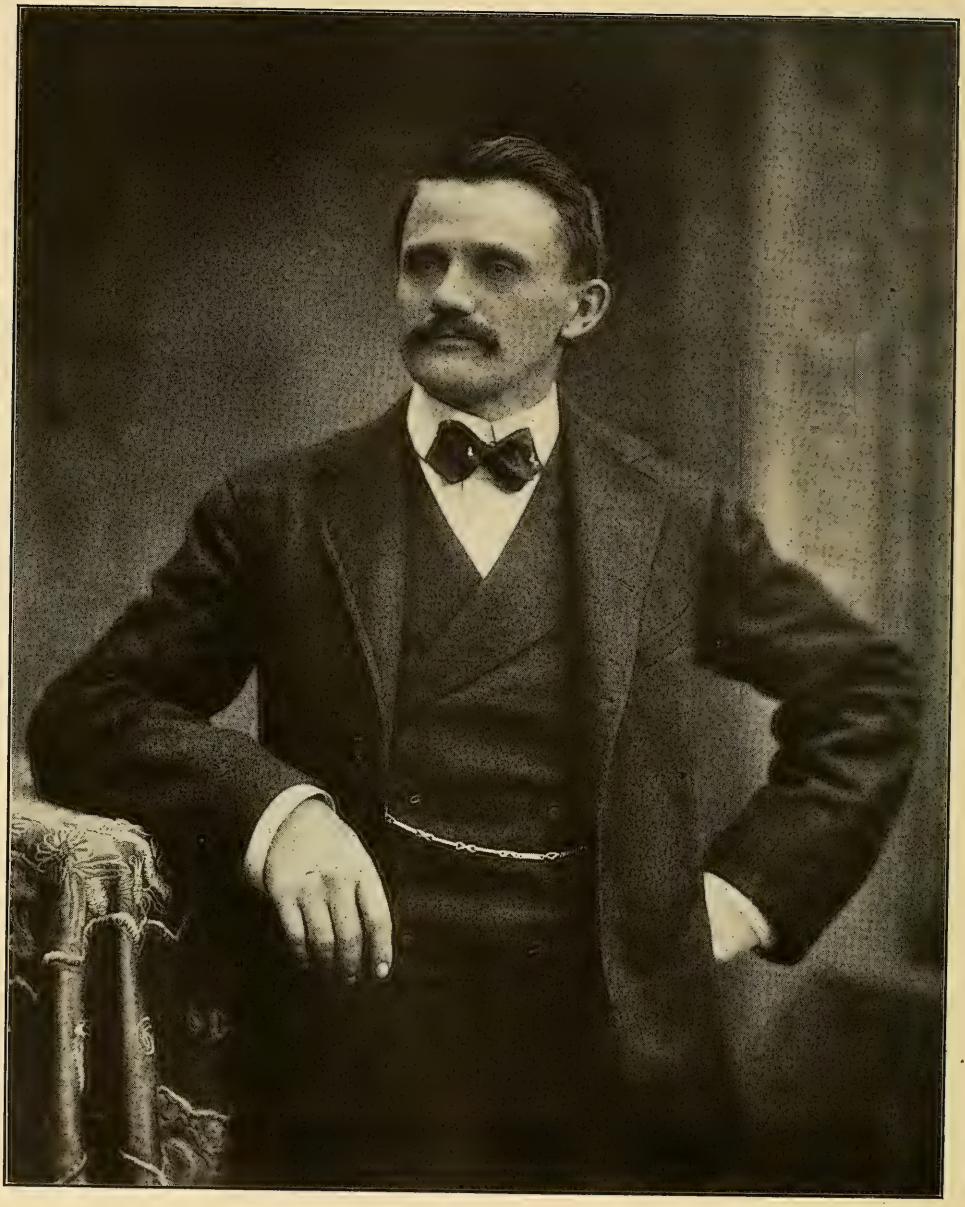
The Spanish Government, more than twenty years ago, formulated an elaborate scheme for the construction of a thoroughly protected harbor, with sufficient depth of water to accommodate the largest ships, and levied a special tax on imports and exports for the purpose of raising the necessary funds to carry it into effect. Operations were begun pursuant thereto shortly thereafter and continued in a slow and intermittent way up to the time of the native outbreak of 1896, with the result that about 30 per cent of the work contemplated was completed. Work upon these plans, with slight modifications, has been resumed by the Commission, which has appropriated $1,000,000 for the purpose.

There are no navigable rivers, roads, or even permanent trails in the islands.

There are numerous water-courses in the great islands of Luzon and Mindanao which have their sources in the mountains of the interior and flow to the sea in rapid and broken currents. As a general rule, they are inconsiderable in volume and are either not navigable at all or, if navigable, only for a few miles from their mouths, so that they may be eliminated in considering the question of transportation.

The so-called highways are generally merely rude trails, which in the rainy season, lasting half the year, are simply impassable, and during the dry season are rough and only available for travel to a very limited extent. As a result, there are few natives of the interior who have ever been beyond the boundaries of towns in which they live. The Commission has appropriated $1,000,000 to be expended at once in road-building.

The Manila and Dagupan Railroad is at this time the only line in the entire island. It was constructed by English capitalists and has been in operation since 1892. It has a gauge of 3 feet and 6 inches and traverses a rather low-lying, fertile region, densely populated. It was perhaps improperly located in the beginning, and crossing, as it does, quite a number of streams near their mouths, which necessitated much trestle and bridge work, was expensive to construct. This expense, it seems, was increased by unnecessary requirements of the Spanish Government. As a result, it appears to have cost the company about $60,000 in gold per mile. It is an expensive line to maintain by reason of the fact that several of the streams, in seasons of flood, overflow their banks and inflict much damage upon the roadbed. But, whilst it has not earned a fair interest on the extravagant sum which it cost, it has been wonderfully beneficial in increasing the population and wealth of the provinces through which it runs and affords a striking illustration of the enormous benefits which



Evelyn B. Baldwin,

Leader of the Baldwin-Ziegler North Polar Expedition.

would accrue were railroads built in other sections of these islands.

A line has been projected from Manila eastward and southeastward, running along the shores of Laguna de Bay across the island to a port on Lamon Bay. This port is said to be the best in the islands, landlocked, affording shelter in any weather, and with a depth sufficient to enable vessels of heavy draft to approach close to shore. With this line built, the distance from Manila to the United States would be shortened by about 700 miles. The line would pass through a number of large towns and a rich and fertile country.

THE PHILIPPINE EXHIBIT AT THE PAN-AMERICAN EXPOSITION

By D. O. Noble Hoffmann

WHEN the Pan-American Commission first considered the idea of a Philippine exhibit at the Buffalo Exposition, they were anxious to have on the grounds a typical Filipino village inhabited by genuine natives—men, women, and children. After much conference with the Government at Washington, it was shown that the cost of such an enterprise would be between $150,000 and $175,000, a sum greatly in excess of what would have been necessary in more peaceful times. Accordingly, the plan was declared not feasible. However, the Commission was anxious to have an exhibit of some kind, and declared the sentiment of the people demanded it. Further efforts resulted in the sum of $10,000 being appropriated for the purpose. It was decided that such a sum could only procure purely ethnological specimens, necessitating the barring out of natural history and other subjects. The exhibit thus was made to include what the people of the Philippine Islands make with their own hands or obtain by purchase or exchange.

The management of the money appropriated was placed in the hands of the Smithsonian Institution, which dispatched the late Col. F. F. Hilder to the Philippines to collect the exhibit. His long residence in the Philippine Islands, together with his acquaintance with many of the tribes and their dialects, and his knowledge of the conditions existing in the islands, coupled with his scientific training, served to fit him in a superior degree for this work.

Colonel Hilder certainly did remarkably well under the circumstances, and gathered an amount of valuable material of great interest and importance to the people of the United States. He collected upward of one thousand pieces, illustrating every phase of native life. Every condition and station, every age and sex, every occupation, pastime, and means of warfare, has a place in the collection.

Apparently hats, swords, and canes are the objects upon which the Filipinos bestow the most pride, for there are enough pieces of head-gear of various makes to fill a hatter's shop; enough swords, plain or fancifully carved, to arm a regulation-sized company, and enough canes to stock the stands of a country-fair mountebank.

The swords are of different shapes. They are all sharpened to the nicety of a razor. The bolo is the prevailing weapon. It is very short, for according to an old edict of the Spanish regime the blade could only extend from the wrist to the elbow in length. It is enough to give one an inspiration of fear. It is used also in cutting sugar-cane, etc. The case is of wood and very often merely bound with twine, so that the wielder can strike through if he has not the time to unsheath the sword. The common bolo has a blade of steel, a wooden handle and an iron ferrule, though some have handles of silver and are far richer in appearance and design. One very formidable and beautiful weapon is the Kriss sword. This has a wavy-shaped blade of steel, the handle being of wood wound with native twine.

Passing to articles of more practical use, one of the first to attract attention is the "Luzon," a mortar used by the Tagals as a receptacle in which to loosen the husk from rice grain by pounding with a wooden pestle. It was the universal use of this article that caused the Spaniards to give the island of Luzon its name.

Then there are looms and other native contrivances, showing the manner of making their different cloths—*husi*, *jusi*, *pina*, *cinamay*, etc. These cloths are found in many beautiful colors—pink, violet, orange, yellow, blue, and black—and some are richly embroidered. Every article of domestic use is to be seen—laundry tubs and boards, scrubbing brushes made of half of a cocoanut in the husk, and brooms made of rice straw, and that necessary household article, the back-scratcher, formed of a small piece of cocoanut shell with serrated edge, laced with cotton thread to a long bamboo handle. Very suggestive of the popular song of the day are some samples of *goo-goo* soap bark. This bark is especially adapted for washing the hair, leaving it soft and glossy, and produces thick suds the same as soap. Extreme care must be taken not to let it get into the eyes.

The native hearth is merely a rectangular frame of wood raised on four uprights of squared bamboo; the bottom is formed by a mat of woven splints of bamboo, the whole forming a box-like construction in which has been laid a quantity of hardened earth composition, on which the fire is built. Pieces of this substance in the shape of small elongated cones serve for supporting pots. At the back of the hearth and fastened to the two rear uprights is a piece of bamboo with two long slots and two holes cut entirely through, in which spoons and other utensils are placed when not in use. The three cooking pots with this exhibit are of red earthenware and unique in design. The spoons are each made of cocoanut shell laced to a handle by strips of rattan.

Making the fire on cold mornings is the unpleasant lot of many Americans. However, they ought not to grumble after they have seen the set of fire-making instruments used by the Filipinos and have had explained to them the laborious task of merely making a light. A piece of bamboo with a slit through the middle is placed on any convenient spot, with some bamboo shavings beneath. Another piece of bamboo is then rubbed through the slit at right angles until the shavings smoke, when the shavings are fanned into a flame.

A model of a native cocoanut-oil factory forms one of the most interesting exhibits of the industrial section. The operator sits on a cross-beam and with his feet revolves, by means of two pedals, a little metal shredder, which cuts up the cocoanut. The meat of the cocoanut then moves to a second worker, who crushes it by means of a roller which he rolls back and forth with one hand. The meat thus crushed enters a

press, which not only presses out the milk and oil, but also keeps back the fiber of the shell. When the boat-like receptacle underneath the press is filled with the oil, milk, and water, it is drawn to a fire, where the contents are heated in cauldrons until the oil rises to the surface and is scooped off.

The farmers of the Philippines have their peaceful occupations well represented. One will find at the fair all their agricultural implements and their clumsy, heavy plows and wagons. Their plows are for the most part made entirely of wood, with the exception of the share, which is of iron. The harrow is formed of a number of pieces of bamboo held together by three transverse rods passing through the pieces of bamboo. The teeth are formed of stubs of branches, with cords and yoke attached for one caribou.

The caribou is used in all their farm work and must be quite a tractable animal. The prudent prospective immigrant to the Philippines may gain a suggestion from a caribou sled which is used in muddy weather along the slimy roads and in the rice swamps. This is very unique and will attract much attention and create comment on the weather conditions prevailing in the Island of Luzon.

The Filipino rice reaper is made with a handle of wood in the shape of a hook and a blade of steel fastened on the under side of the grip. In using this implement it is held in the right hand and the hook gathers in the rice while the knife cuts it in one operation.

Farmers will smile when they see a farmer's costume such as is worn by the agricultural class among the Tagals of Luzon. It consists of a shirt of *husi* cloth, a pair of trousers, and a piece of cloth used for carrying articles over the shoulder or on the back.

That nature still supplies the wants of the Filipinos to a great extent is shown by a supply of fishing tackle, nets, seines, shrimp and crab traps. Their fishing boats are called *bancas*. One of the most interesting things in the fishing line is a seashell from Tondo, a fishing point in the suburbs of Manila. The apex of this shell is sawn off to form a mouth-piece, and is used by the fishermen to call assistance when large schools of fish are found.

In the collection there is a milk vender's outfit, such as is used in the cities of the Philippines. The outfit consists of a black earthenware jar hung in a network of rattan partly covered with leather, a wooden shoulder yoke for carrying the jar, a pitcher formed from one section of a large bamboo, with a wooden handle attached by wire, and a measure also formed from a section of bamboo, branded with the inspection and license number of the vender.

Other trades are represented by appropriate exhibits, as the soldering pan and irons and tools of native tinsmiths. The pans are made of heavy earthenware. There is a set of native carpenter's tools; also a native harness-maker's outfit, with samples of tanned leather, a set of blacksmith's tools, and a set of mason's tools.

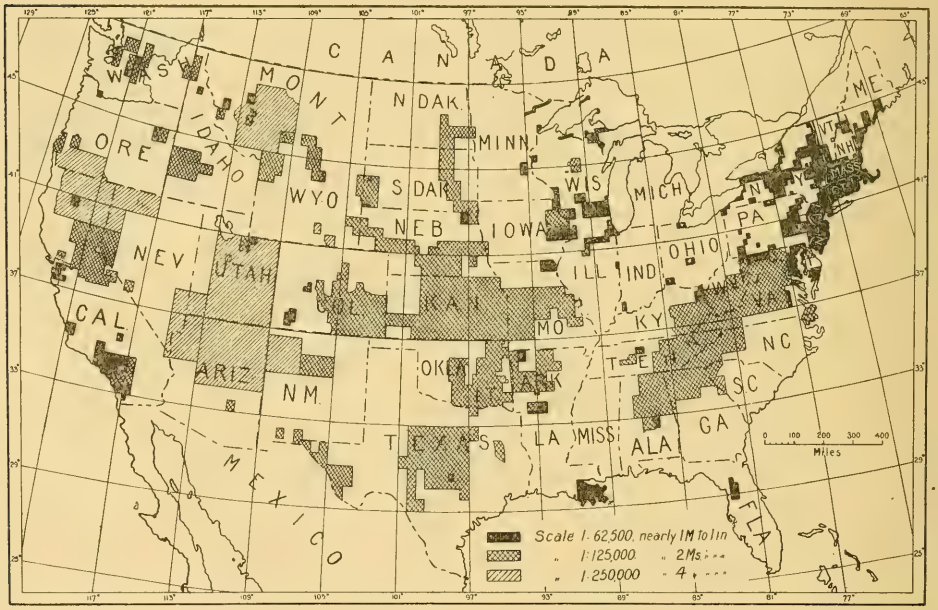
The amusements and forms of recreation of the Filipinos also have a place in the collection. They are evidently a musically inclined people, judging from the gay costumes of a native band of musicians with their instruments—mandolin, flute, guitar, violin, and 'cello. In the musical collection are a beautiful harp made of two kinds of *narras* wood and ebony, and an instrument supposed to be a horn, made from four sections of bamboo, each open at one end and closed at the other. The sections are inserted into one another at right angles and the joints made air-tight with a native gum, the last section being fastened to the main tube by rattan. The horn is held horizontally and played in the same manner as a cornet.

The Filipinos have many forms of amusements, but the greatest of them all is cock-fighting. There is in the Hilder collection a cock-fighter's box, containing four steel gaffs to fasten on the fighting cock's spurs and four leashes to restrict them when not actively engaged. *Pompa cabeza*, a puzzle game, is shown. Natives in nearly every part of Luzon play this game, which is attended with much betting. Roulette wheels and other games of chance are much in vogue throughout the islands, as the collection shows.

Foot ball must be a popular game in the islands, judging by a ball which the Filipino tosses and kicks about. It is somewhat different from our regulation foot ball, being made of a number of strips or splints of rattan tied in the form of a "Turk's head" knot.

Forcible illustrations of Filipino warfare are fifteen cylindrical canisters of native Filipino manufacture, formed of sheets of tin nailed around two circular pieces of wood; they are filled with scraps of iron and fired by insurgents from smooth-bore guns at very short range; and a bamboo cannon bound with wire, captured by United States troops, at Balange Bataan, on January 5, 1900.

The exhibit comprises much more than can be covered in a brief article. It will prove profitable in giving information as to commercial interests, besides giving new ideas and opinions concerning the Philippines and their people.



GEOGRAPHIC NOTES

TOPOGRAPHIC MAPPING OF THE UNITED STATES.

NEARLY 900,000 square miles, or about 30 per cent, of the area of the United States have been mapped by the experts of the U. S. Geological Survey during the past twenty years. New England, the middle Atlantic States, and small sections of Wisconsin, Iowa, Louisiana, and California have been mapped on the scale of one mile to one inch and their elevations and surface relief expressed by contour lines located at intervals of 5 to 20 feet vertically. Maps of large sections of Kansas, Missouri, Texas, and Virginia have been made on the scale of two miles to an inch and with contour lines indicating vertical intervals of 20 to 100 feet.

Mr. H. M. Wilson, of the Geological Survey, contributes to a recent number of *The Engineering News* an interesting statement of this branch of work of the survey and explains its great practical value. As an example he mentions the case of the city of Waterbury, Conn., which, after spending $10,000 in fruitlessly searching for sources of water supply, learned on consulting the Government topographic maps of a source of good water previously unsuspected. The survey expends nearly $350,000 annually in making these maps. Many States also appropriate large sums to assist the work of the survey in their particular areas. New York, Pennsylvania, Maine, Alabama, and Maryland annually appropriate $75,000 to hurry the completion of the mapping of their territory. The expense of mapping naturally depends upon the character of the country. The cost of mapping an open country is from five to ten dollars a square mile; that of mountainous or forest areas about double or triple that amount.

The results of these surveys are published on sheets approximately 16½ by 20 inches and represent quadrilaterals of 15′ or 30′ of latitude and longitude, according as the scale is one or two miles to the inch.

The atlas sheets can be procured at purely nominal prices on application to the Director of the Geological Survey.

THE GERMAN CENSUS.

THE figures of the last census of Germany reveal some very significant facts relative to the great industrial and agricultural contest that is now being waged in the Empire. The census was taken on December 1, 1900. The growth of the cities, the industrial centers, during the preceding five years has been unprecedented in the history of the Empire. Of the thirty-three cities with a population of over 100,000, every one but Crefeld shows a great increase. Crefeld has decreased by 350, owing probably to the high tariff in the United States on silk goods, which has caused Americans to import only foreign silks of the highest grade. As a result, many hundreds of persons in Crefeld who were formerly employed in the silk factories were thrown out of work. Crefeld manufacturers have now begun to turn their attention to the making of cotton and woolen goods, and it is hoped that the next census will show an increase, not a decrease, in the population. Among the cities which show the largest increase is Berlin, which has added over 207,000, or 12.3 per cent, to the number of her inhabitants, making her present population 1,884,345, not including the suburban cities. Including her suburbs, Berlin numbers 2,500,000.

The city that has increased most rapidly is Nuremberg, which in five years

has added 98,357, or 60 per cent, in a total population of 260,743. This is due largely to the situation of Nuremberg at the point of junction of many highways and of seven railroads. The city of Posen has increased by 42,912 since 1895, largely by the influx of farmers and agricultural people from the country, more especially from Prussia.

Stettin now numbers 209,988 souls, an increase in population of 69,264, owing to its position as the seaport of Berlin.

Hamburg has added 79,117, making a population of 704,069; Munich, 87,502, making a total of 498,503. Leipsic has gained 55,126 in a present population of 455,120, Dresden 58,909 in 305,349, and Frankfort has increased 58,534, making her population 287,813.

These figures show clearly that the Germans are becoming more and more a manufacturing people. The land-owners are becoming alarmed and are even discussing the advisability of importing Chinese to work on their farms.

The population of the empire is 56,345,014, an increase of about four million, or of 7.78 per cent within five years. It is interesting to note that there are nearly a million more females than males, whereas in the United States this proportion is reversed.

EFFECT OF SNOWFALL ON WATER SUPPLY.

SOME very interesting conclusions have been published by the experts of the U. S. Weather Bureau, who have for several years been studying the effect of winter snowfall on the water supply of the succeeding summer. The observations have been confined to the arid regions of the west, more particularly Colorado and Idaho, where the rivers and streams derive their principal water supply from the melting of the snow on the mountains.

The generally prevalent belief that a winter of heavy snowfall is succeeded by swollen streams in spring and summer is not necessarily correct. It is not the quantity of snow that falls during the winter so much as the condition of the soil when winter sets in, the quality of the snow, and the time when it falls, that determine whether streams shall continue full late in the season and furnish abundance of water for irrigating canals. An unusually heavy snowfall in March will certainly be followed by drought in late spring and summer, unless this snow was preceded by a snowfall in the early winter. It is the snow that falls in November and December, and thus becomes packed hard during the winter and melts slowly in the spring and summer, that keeps water in the streams till summer is nearly over. The snow that falls in March and February has no time to become packed and hardened. The first warm breath of spring melts it with a rush, the streams overflow their banks, freshets flood the country for a few days; then gradually the streams subside and a drought ensues.

The issuing of special snow bulletins has been continued this winter by the section directors of the U. S. Weather Bureau in Colorado, Montana, Idaho, Utah, New Mexico, and Wyoming. These bulletins give the average amount of snow on the ground, the amount in the timber line, and the depth of the snow at or near the mountain summits. From their knowledge of the depth, character, and distribution of the snow, the Weather Bureau experts are able to give a reliable general forecast of the water supply for the ensuing season for the different streams of the arid section. The farmer thus learns months in advance the quantity of water his irrigating ditches are likely to receive. The sheep-herder also studies the snow bulletin with profit. In early spring bands of sheep begin to roam the prai-

ries, keeping, of course, close to water. Often the sheep may travel 400 to 600 miles, and by knowing the character and amount of the snow in the mountains, the herder can follow a route where water will be plentiful.

GEOGRAPHIC NAMES.

THE following decisions were made by the United States Board on Geographic Names, February 6, 1901 :

Ambrose ; the channel across Sandy Hook Bar, New York Harbor, formerly known as East Harbor, was renamed Ambrose Channel by an act of Congress approved June 6, 1900. In that act it is "*Provided*, That the so-called East Channel across Sandy Hook Bar, New York Harbor, for the improvement of which provision was made by the river and harbor act, approved March third, eighteen hundred and ninety-nine, shall hereafter be known as Ambrose Channel" (Statutes at Large, 56th Congress, 1st session, pp. 588 and 627). The name Ambrose is here included *not* as a decision of the Board, but as a decision by Congress.

Conaskonk ; point, Monmouth County, New Jersey (not Conaskonck).

Cove City ; township, Crawford County, Arkansas (not Core).

Garrett ; hill in Middletown, Monmouth County, New Jersey (not Garret nor Garrett's).

Guttenberg ; post-office and railroad station, Clayton County, Iowa (not Guttenburg).

Kekurnoi ; cape near Cold Bay, Shelikof Strait, Alaska (not Kahurnoi, Nelupaki, nor Nukakalkak).

Kessler ; mountain and triangulation station near Fayetteville, Washington County, Arkansas (not Kestler).

Klahini ; river tributary to Burroughs Bay, Behm Canal, southeastern Alaska (not Clahona nor Klaheena).

Leechville ; post-office, Beaufort County, North Carolina (not Leachville).

Steele ; point, the easternmost point of Hinchinbrook Island, Prince William Sound, Alaska (not Bentinck nor Steel).

Tuttle ; lake, Polk County, Wisconsin (not Swahn).

West Point ; United States Military Academy, New York (not Westpoint).

CHARTING THE HARBORS OF THE PHILIPPINES.

Preliminary steps have been taken by the U. S. Coast and Geodetic Survey for charting the harbors and coast of the Philippine Islands. A sub-office of the Survey has been established at Manila, in charge of G. R. Putnam, who has a force of men collecting material to assist in the work. In the early spring active work will be commenced and pushed, so that it is hoped that sufficient accurate data will have been obtained by the fall to enable the publication of charts of the larger harbors among the islands. There are no charts of the many minor ports in the islands that serve as points of distribution for the inter-island trade, and these also must be charted.

GEOGRAPHIC LITERATURE

The Century Atlas of the World. Prepared under the superintendence of Benjamin E. Smith. New York: The Century Co., 1899. $7.50.

The Century Atlas, which was first published in 1897, and followed by a second edition in 1899, has doubtless been consulted at various times by every reader of this Magazine. A review or notice of the Atlas would now be superfluous. The publishers, however, have made such a generous proposition to the members of the National Geographic Society, and to the members of one or two other scientific bodies in the United States, that the great value of the work should again be emphasized.

The Atlas was originally published as a separate volume to enable subscribers to the Century Dictionary to complete their sets. Of the edition a few hundred copies remain. These the publishers have offered to members of the National Geographic Society at one-half the original price ($7.50 instead of $15). The Atlas will not be sold separately as soon as these copies are disposed of, and can then be obtained only by purchasing the entire set of 10 volumes that comprise "The Century Dictionary and Cyclopedia."

The Atlas contains 117 double-page maps, 138 inset maps, and 43 historical and astronomical maps. There are nearly 200,000 references to places in the indexes. To each of the principal States two or three maps are allotted, showing all the rivers, lakes, and hills in great detail. Maps of the large cities with their environs are presented, and the harbors of great seaports are also clearly charted. In its foreign maps the Century Atlas excels, the maps of China and the Far East being especially valuable.

Moore's Meteorological Almanac and Weather Guide. By Prof. Willis L. Moore, LL. D., Chief of United States Weather Bureau. With illustrations and 32 charts, pp. 128. Chicago and New York: Rand, McNally & Co., 1901. $0.25.

Unlike the traditional almanac that is crammed with queer statements and queer dates, this little book is a reservoir of reliable information for "the farmer, the horticulturist, the shipper, the mariner, the merchant, the tourist, the health-seeker, and for those who wish to learn the art of weather forecasting."

Perhaps the most interesting and valuable chapter is that on "the construction and the use of the weather map," which explains how an amateur, by consulting the government daily weather chart, can follow the track of storms, and with considerable accuracy forecast the weather. The difference between the cyclone and the tornado, terms usually used as synonymous, is emphasized in another chapter. "The cyclone is a horizontally revolving disk of air covering an area 1,000 to 2,000 miles in diameter, while the tornado is a revolving mass of air of only 100 to 1,000 feet in diameter, and is simply an incident of the cyclone." Prof. Moore states, under the subject of "Protection against Frost," that, in his opinion, with approved appliances, the fruit districts of California and the orange groves of Florida could secure material protection against frost. Other instructive chapters are: "Long-range Forecasts," "The Galveston Hurricane of 1900," "Loss of Life and Property by Lightning," "Weather Bureau Kites," and "Temperatures Injurious to Food Products."

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY

Popular Meetings.

February 1, 1901.—President Graham Bell in the chair. Señor Dr. Don Juan N. Navarro, Mexican Consul General in New York city, delivered an illustrated address, "Mexico of Today."

February 15, 1901.—Vice-President W J McGee in the chair. Mr. Oscar T. Crosby delivered an illustrated address, "Explorations in Abyssinia in 1900."

Technical Meetings.

January 25, 1901.—President Graham Bell in the chair. Prof. Alfred J. Henry, of the United States Weather Bureau, read a paper on the anomalous distribution of rainfall in the Gulf and South Atlantic States during the eleven years 1889–1899. Ordinarily, Professor Henry said, years of fat and lean rainfall follow each other in a very irregular procession. A single dry year may be followed by a second and even a third, but rarely by a fourth. Wet years likewise may occur in groups, but the number of years in a group seldom exceed three.

In the case to which attention was particularly called eleven consecutive dry years were experienced. The annual deficiency at the several stations varied largely. In some years it was not more than 10 per cent of the mean annual fall; in others it was as much as 50 per cent. Happily the mean annual fall in the region referred to is so great that an annual deficit of 50 per cent does not create serious alarm.

Dr. H. C. Frankenfield inquired whether the deficiency in large cities was due to general causes or to steadily growing artificial conditions, such as the increased use of electrical appliances? Professor Henry replied that the deficiency was common to both cities and small towns and even to exposed points on the sea coast. It was probably due in part to a shifting in latitude of the paths of storms and to a diminution in the number of tropical disturbances arising in the Gulf of Mexico or advancing toward the southern coast of the United States from the Caribbean.

Prof. Willis L. Moore called attention to the very great paucity of meteorological records and the exceedingly short time that such records had been continued. We should have, he said, at least a hundred years' observations before we could hope to account for such marked variations as had been described.

Mr. N. H. Darton read a paper entitled "The Powder River Range in Eastern Wyoming." The title of Mr. A. C. Spencer's paper was "A High Plateau in the Copper River Region of Alaska," an interesting description of certain physiographic features of that section of Alaska. In "The Distribution of Trees and Shrubs in Alaska," by F. V. Coville, the speaker traced the zones of plant life in Alaska and gave several possible explanations of the strange absence of vegetation on the Aleutian Islands.

February 8, 1901.—President Graham Bell in the chair. Prof. Frank H. Bigelow read a paper entitled "*The Plateau Barometry of the United States*," the first public announcement of an important work that the Weather Bureau has been prosecuting during the last two years.

The reduction of barometric readings of pressure, taken at the stations on the Rocky Mountain Plateau to the sea-level, has been a problem of special importance to the Weather Bureau, on account of their employment in forming daily weather charts. It is also one

of much scientific difficulty, because of some uncertainty in the elevation of the stations, and the proper temperature argument to be used in making the necessary reductions. With the lapse of time the necessary observations have accumulated to such an extent that it has become desirable to reduce the entire series taken during the past 30 years to a homogeneous system, with the epoch January 1, 1900. Professor Bigelow has been conducting this research for the past two years, and the work is now approaching completion.

The present investigation has included a complete remodeling of the station elevation data; the reduction of all the pressures to a normal station pressure, which has never been done before, by the application of a system of corrections for elevation, gravity, instrumental error, and diurnal variation; the careful determination of the temperature gradients in latitude, longitude, and altitude; the reduction to sea-level by new tables; the determination of residuals due to local abnormalities, to inaccurate elevations, and to incomplete series of observations, as for those of only a few years' duration, and the further correction of the station pressures to a homogeneous normal system.

This work will also contain normal maps of pressure, temperature, and vapor tension on the three following planes: sea-level, 3,500 feet, and 10,000 feet. From these data it will be practicable, in connection with the gradients obtained from the International Cloud Observatories, to make good daily weather maps on the three planes above mentioned, and thus to provide further means of studying the behavior of storms and the atmospheric circulation generally, at other levels than that of the sea, to which the forecaster is at present confined for his predictions.

Mr. E. C. Barnard presented a plan of work in exploratory surveys.

Announcement of Meetings.

March 1.—"The Recent Famine in India," by Gilson Willetts.

March 15.—"The Two Ends of the Earth: Peary and the North Pole, and the Cruise of the *Belgica* in the Antarctics," by H. L. Bridgman and Frederick A. Cook.

March 29.—"Railways and Waterways of the Russian Empire," by Alexander Hume Ford.

These meetings will be held in the Congregational church, Tenth and G streets northwest, at 8 p. m.

Technical meetings for the reading of papers and for discussion will be held in the hall of the Cosmos Club Friday evenings, March 8 and 23, at 8 p. m.

As previously announced, the subject of the afternoon series of lectures for this year is "The Countries of Asia." The dates and lecturers are as follows:

March 5.—"Western Asia," by Talcott Williams, LL. D., of the *Philadelphia Press.*

March 12.—"Eastern Asia (China)." Name of lecturer to be announced later.

March 20.—"Southern Asia (India)." Name of lecturer to be announced later.

March 26.—"Northern Asia (Siberia)," by Edwin A. Grosvenor, Professor of Modern Governments in Amherst College.

April 2.—"Asia—The Cradle of Humanity," by W J McGee, Vice-President of the National Geographic Society.

These lectures will be given in the Columbia Theatre, Twelfth and F streets northwest, at 4.20 p. m.

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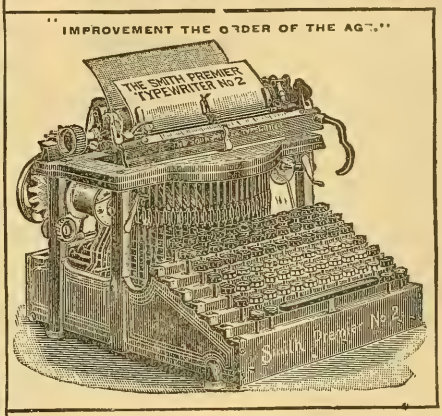

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Vol. XII APRIL, 1901 No. 4

CONTENTS

THE OLD YUMA TRAIL. BY W J McGEE, VICE-PRESIDENT NATIONAL GEOGRAPHIC SOCIETY. ILLUSTRATED . . PAGE 129

ADVANCES IN GEOGRAPHIC KNOWLEDGE DURING THE NINETEENTH CENTURY. BY GEN. A. W. GREELY, U. S. ARMY. ILLUSTRATED 143

MEXICO OF TODAY. BY SENOR DR. DON JUAN N. NAVARRO, MEXICAN CONSUL-GENERAL IN NEW YORK CITY . . 152

GEOGRAPHIC NOTES 158

GEOGRAPHIC LITERATURE 165

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY . . 166

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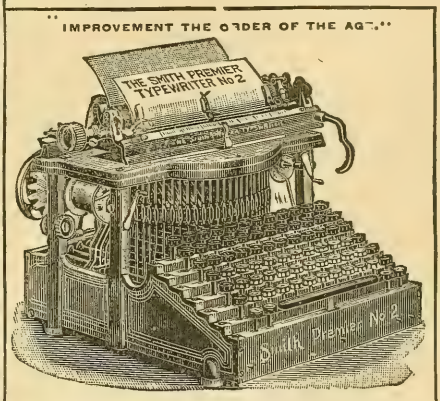

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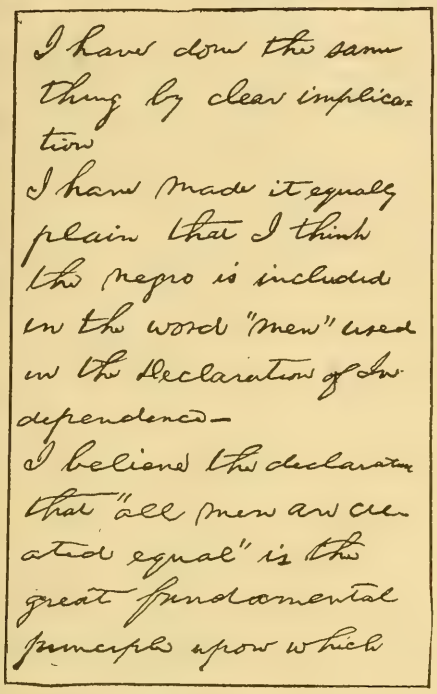

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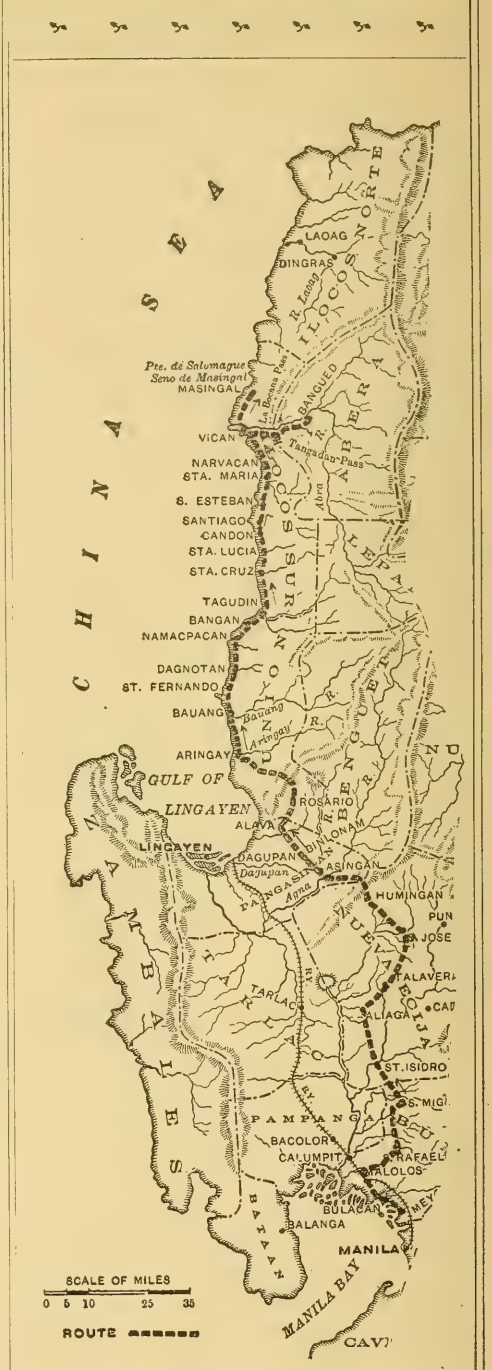


Map Showing Route Traversed by Mr. Sonnichsen

VOL. XII, No. 4 WASHINGTON APRIL, 1901

THE NATIONAL GEOGRAPHIC MAGAZINE

THE OLD YUMA TRAIL

BY W J McGEE, VICE-PRESIDENT OF THE NATIONAL GEOGRAPHIC SOCIETY

THE distinctive part of the Old Yuma Trail lies between Sonoyta (long. 112° 50′) and Sierra Gila (long. 114° 05′), the southwesternmost range of Arizona; between these points it nearly coincides with the international boundary. East of the old-time Place of Corn there are several tributary trails. The ancient and modern pilgrimage-path leads westward from Baboquivari Peak (long. 111° 40′) to a capricious watering place at the southern end of Santa Rosa Mountains (long. 112° 30′), and thence on to Sonoyta; the early Mexican route led through Magdalena and Santa Ana, and thence through Altar and over the plains to the Santa Rosa water; the later Mexican approach (afterward adopted by many American pioneers) can be traced through Fronteras to the old mission of Tubac, and thence through Arivaca and Sasabe to a practically permanent water at the southern end of Sierra Baboquivari (Poso Verde), and on over the plains now intersected by the boundary to Santa Rosa and Sonoyta; while an alternative American approach lies through the ancient city of Tucson and by Coyote spring (at the northern end of Sierra Baboquivari) to the main trail anywhere east of Santa Rosa, and thence to Sonoyta. From this oasis westward there is but a single way to Tinajas Altas, near the southern end of Sierra Gila; but there the tracks diverge, one distributary leading down the northeastern side of the range to Rio Gila, another through a neighboring pass and thence directly northwestward to Yuma, with a third (theoretically at least; the way is practically impassable save by well-equipped expeditions) across the drifting sands stretching to Rio Colorado at the point touched by the Arizona-Sonora boundary.

The Santo Domingo of today stands on the site of the wooden cross erected by the padres over two centuries ago. It is a feudal Mexican village of the type prevailing in the remoter districts. Owned and governed (with constant fealty to the distant but beloved Presidente and the much-adored Carmencita, who is to Mexico what Victoria was to Britain) by Don Cipriano Ortega, it com-

"The Santo Domingo of today . . ."

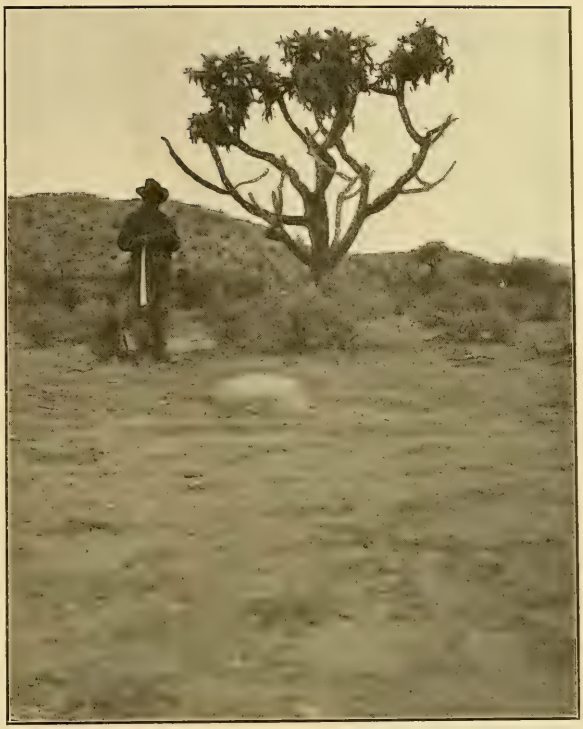
prises a chief residence, a habitation for the aduana (customs office), a smaller house occupied by a minor branch of the family, a church with horseshoe-shape bell arch, and three or four shops and stables, all of adobe, flat-roofed and one low story high; besides, there is an abandoned ore mill of half a dozen steam-driven arrastres, while half a dozen Papago Indian huts form the customary "lower town." The rancho is large, skilfully irrigated, and so productive that corrals and sheds are filled with vigorous stock and abundant grain-hay and barley. The nearest low spur of Sierra Sonoyta better attests the antiquity of the settlement than the few houses and inhabitants; for there the evangelists and their civil successors have laid seven or eight generations of their dead in cross-marked sepulchres, while hard by lies the much more populous cemetery of the Papago dependents—those of the pagan dead in the form of a *ki* (house), but built of stones and strewn with the bones of sacrificed horses; those of the converts in similar form, though built of earth and decently marked with crosses outlined in pebbles. At both residence and aduana the ethnologic expedition was welcomed and supported by Don Bartolo Ortega (in the temporary absence of the eldest brother), as well as by the local customs officer, Señor Garcias, the way having been made easy by the courteous prevision of Mexican authorities.*

ON THE WAY WESTWARD

On November 15, 1900, a six-mule wagon carrying all the casks and kegs

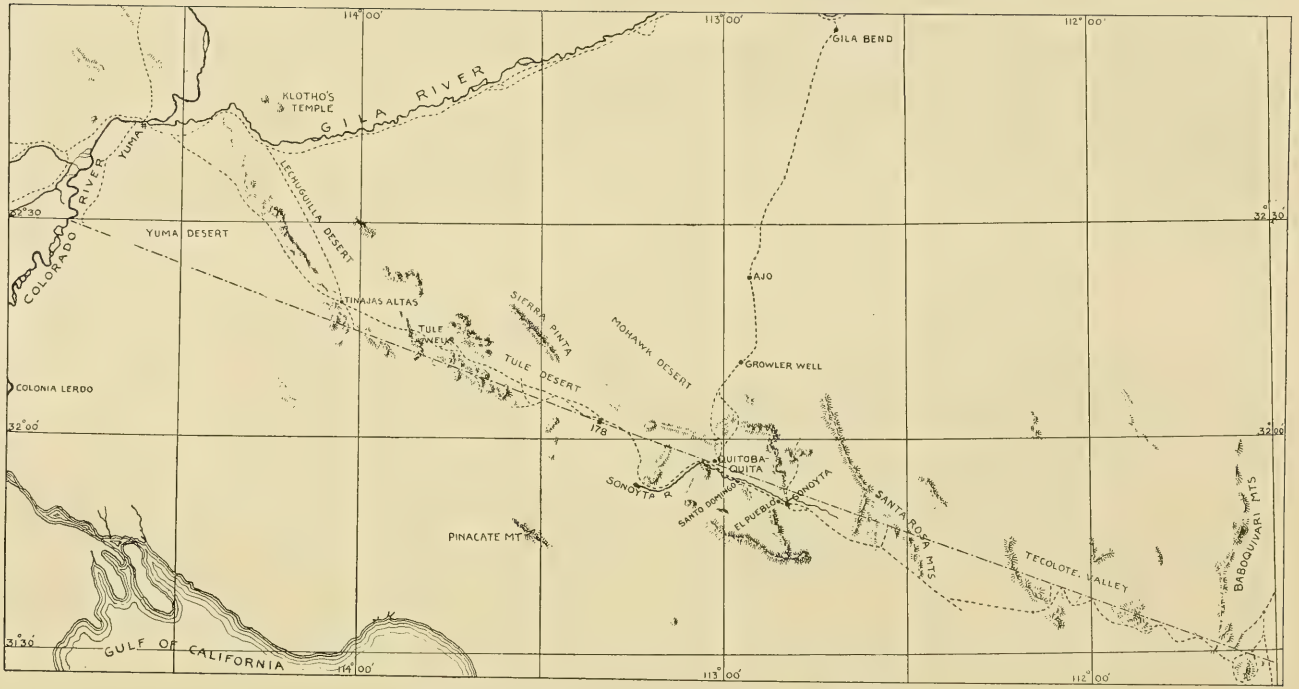
* His Excellency Manuel de Aspiroz, the Mexican Ambassador at Washington, and Excellencia Fernando Leal, Secretario de Fomento, in Mexico, were on this occasion, as on others, most liberal and obliging in furnishing authority for the international ethnologic work, while the Mexican authorities at Nogales were so generous as to send a representative to Phœnix, and thence with the expedition to Santo Domingo. The party comprised W J McGee, in charge; De Lancey Gill, artist; Professor R. H. Forbes, of Tucson, a guest during part of the expedition; John J. Carroll and Jim Moberly, stockmen; Aurelio Mata, Mexican customs officer, and Ramon Zapeda, Mexican interpreter, with Hugh Norris, Papago interpreter. The entire route was from Phœnix to Gila Bend; thence *via* Ajo to Quitobaquito and Santo Domingo; thence to Sonoyta and southward *via* Quitobac, Cozon, and Las Tajitas to Caborca; next westward to the Gulf shore (at the point recently occupied by the now extinct Tepoka tribe), and thence back, mainly by new routes, to Santo Domingo. From this point the old Yuma trail was traversed to Tinajas Altas, and thence *via* Gila City to Yuma, whence the expedition pushed on to the Cocopa country, near the mouth of Colorado river, afterward returning *via* Yuma and the Gila valley to Phœnix.

of both Santo Domingo and Sonoyta, besides a quarter-load of hay and grain, set out on the Old Yuma Trail under an arrangement with Don Bartolo to deliver water and feed in Tule Pass (sixty-odd miles away) by the third evening; next day the four-mule light wagon and the four saddle animals of the expedition were on the road betimes. Crossing the sandwash of Rio Sonoyta —a channel broad enough for the Ohio, deep enough for the Schuylkill, but dust-dry from bank to bank—the way meandered over a cactus-dotted plain simulating a vast alluvial deposit but revealing its origin by sheetflood carving in occasional projecting bosses of granite; passing monument 172, it swung a few yards north of the boundary to touch at Quitobaquito—the Papago village with five centuries behind it, and two adobe houses besides a half-dozen native huts within it. Here the entire white population (Mr. M. G. Levy, merchant, mine-owner, justice of the peace, and deputy sheriff) was avidly hospitable, the native residents attentive, as became the unusualness of the event; and the side-barrels and half-dozen canteens of the outfit were soon filled with the slightly alkaline yet palatable and wholesome water from the spring. Quitobaquito lies amid the southeasternmost foothills of a sierra bearing the name of spring and village; a dozen miles away the range divides, a spur setting off southward to form Cerro Salado (or Sierra de la Salada), and the trail veers partly to avoid this spur, partly to touch the "last water" near its tip.



"A cactus-dotted plain . . . revealing its origin . . . in occasional projecting bosses of granite."

Beyond Quitobaquito the ancient trail grows impressive. True, the narrow stock-path followed by the wagons is in large part new; but, as well seen from the crest of Cerro Huerfano, the new track diverges from the old only because the old was so deep that it has become a storm-cut arroya—indeed for miles Rio Sonoyta abandons the ancient sandwash during its brief spurts of activity to convert the wheel-worn way into a flood-channel. Prehistoric sites and relics of the early stone age are sparsely scattered over the plain; the ruins of a Mexican rancho, with well and corral and acequias, lie three miles west of Quitobaquito; and there is an abandoned ganadero (stock ranch) at the "last water" five miles beyond, known commonly as "Agua Dulce" from the



The Country of the Old Yuma Trail.

alkaline sweetness of the water, properly as "Agua Salada" from its salinity. The "agua" is merely the small residuum of underflow and local seepage brought to the surface of the Sonoyta sandwash by impervious ledges of Cerro Salado in their subterranean extension across the valley; and the banks and bottom are encrusted with frost-like efflorescences of mineral salts. The water is fair for stock, just potable for men; it is a resort for half-wild cattle and horses and burros ranging the sierras and valleys for twenty miles beyond; but the latest sign is that of Don Bartolo's outfit, whose casks and kegs were filled twenty-four hours earlier. Here we pitch a tentless camp, with the first graves of the Old Yuma Trail on a low spur hard by; the sky is clear, though the air is heavy and warm; and Coyote (the Wise One of Papago lore) creeps near to sing his rain-song—a sleep-breaking wail well understood of the vaqueros.

THE SUMP OF THE SONOYTA

The first faint dawn of the 17th is ushered by a slow sprinkle from low clouds, forming a fog-bank half way up the Cerro, but so light overhead that the brighter stars glimmer through; and blankets are hurriedly rolled and loaded, breakfast is bolted, and the outfit is under way in the gray twilight. With sunrise the floating fogs fade, revealing the entire salt-pan in which Rio Sonoyta comes to an end—a basin of a score square miles, bounded on the north by Cerro Salado and its footslopes, on the west by minor ranges running down from Sierra Pinecate, and on the southeast by a sheetflood slope studded with volcanic buttes and mesas; while the old valley opening southwestward to the Gulf stops at a dam of hundred-foot dunes marking the margin of the Red Desert—a seaborn tide of sand slowly engulfing the lowlands of Sonora from Rio Colorado to Lobos Point. This is the "sink" of the Sonoyta in the pioneers' vernacular, its evaporating vat in physical fact; after freshets it is lake or morass according to the volume of the flood, and then bottomless mire for weeks; now it is a Titan-patterned carpet of red, white, yellow, and black efflorescences, relieved by the greens of salt-enduring shrubbery on higher spots. On the hard-baked surface-crust the hoofs drum and the wheels rumble with a hollow reverberation more disturbing to animals than to men—albeit reminders to these of tragedies galore in the treacherous sump. A herd of wild burros see or scent the leading horseman from afar, and after deer-like stamps and snorts and other signals gather in a bunch, with dams and foals in the lead and males in the rear, to skim with amazing swiftness—recalling the wild asses of Arabia—down the rocky slopes and over the resounding playa obliquely across the trail toward the impassable sand-dunes; while an occasional band of half-wild horses may be glimpsed lurking behind mesquite clumps or scurrying for more distant shelter.

The trail leaves the Sonoyta basin about longitude 113° 10′, and ten miles south of the boundary; thence it wanders northwestward over rocky footslopes, bending slightly to avoid isolated buttes and curving more sharply to cross arroyos, for a dozen miles—to an imperceptible divide and the invisible frontier, where it enters a typical valley-plain of southwestern Arizona. Just outside the basin we overtake the supply outfit (which should have been thirty miles further on), and learn of the broken queen bolt and the long night ride by the Mexican to replace it, while the Indian staid by the stock; and we foregather to revise plans, swallowing apprehensions and a cold bite as the rare clouds of Papagueria gather to break in noonday showers and dispel the darkest danger of the desert. After arranging a rendezvous where galleta grass may be

found (for all stock trails are now left behind), the lighter outfit pushes on to outspan in sight of monument 178 (longitude 113° 20′)—the first "dry" camp on the Old Trail. Here sign of antelope and deer are seen, and the galleta is recovering slowly from the over-pasturage of the mid-century; Mr. Gill finds a curious aboriginal cache in a cavern of the volcanic butte on which the monument stands; and showers come and go throughout the night.

ACROSS PLAYAS AND MALPAIS

The second morning from Santo Domingo is cool and cloudy; blankets and saddles are stiff with the wet, the animals fractious; but three miles of smooth going and a rising sun bring comfort with the passage through a congeries of granite picachos rising abruptly from the level plain—and the pass is a gateway into Tule Desert. The first quarter of this expanse alternates between bare playa and a lax thicket of creosote (*Larrea*) growing in extraordinary luxuriance (clumps twelve feet high and branches fifteen feet long are common), while the silty floor is riven every few rods by giant shrinkage-cracks, often a foot or more wide and a yard or two deep. Fortunately the showers here have been light; yet the alkaline silt is tenacious mud, fetlock-deep for the mules and twice felloe-deep for the wagons. The next fraction of the valley is a tongue of the Red Desert, reaching in by the western end of Sierra Pinecate and stretching a dozen miles northward to lap the base of parti-colored Sierra Pinta; for five miles the old trail (which was lost in the playas) reappears here and there as a deep-worn way, partly filled and often obliterated by drifting sands; and the dead drag is the more dispiriting for the steady upgrade toward the malpais belt dividing Tule Valley.

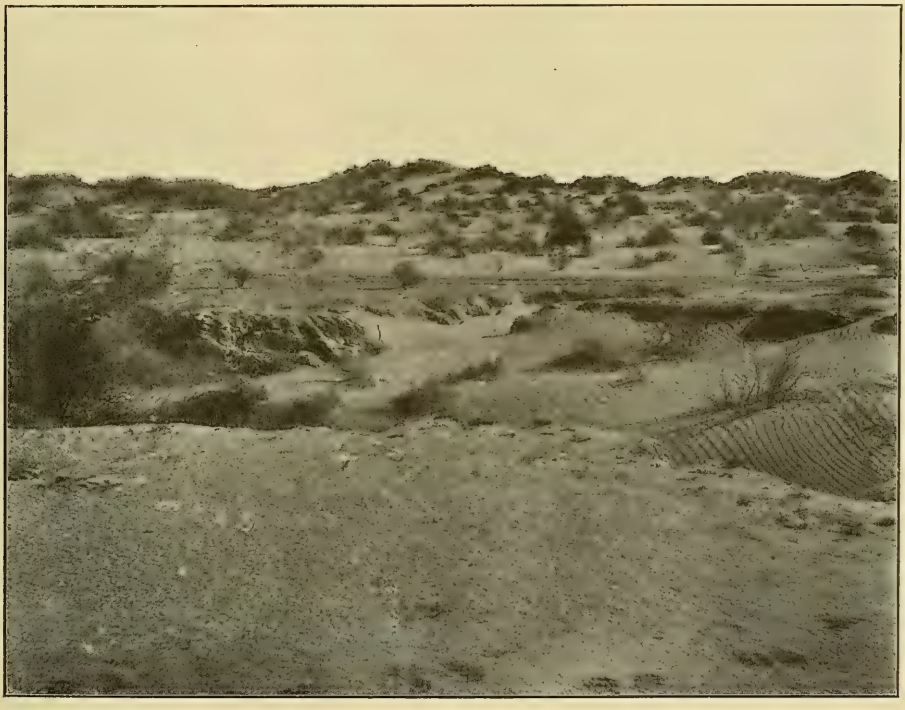
This malpais—theme of many a traveler's tale—forms a notable feature of the old route. It is a vast sheet of black lava stretching toward Sierra Pinta from a group of craters (and probably unseen fissures as well) a few furlongs or miles south of the roadway; but while so youthful, in geologic sense, that the principal lines and lobes of flowage and the rugged scarps of the margins remain distinct, the surface is weathered into a pavement of pebbles bedded below in light yellow sand but polished above by a "desert varnish" of remarkable brilliance; and the pebbles are set so close that the varnished surfaces form a nearly continuous mirror miles in extent, reflecting light and heat with painful intensity. The malpais belt forms a low mesa on which an occasional scrubby mesquite or saguaro (*Cereus giganteus*) or pitahaya (*Cereus engelmannii*) has found lodgment; it affords fine views of the Painted Range on the north, of the serrate crests and pointed peaks brought out by the afternoon sun in Tule Mountains, and especially of Sierra Pinecate, now falling into the rear on the left; and the last view serves to rectify the reports of the pioneers by showing that Pinecate is not a crater but a range, that the malpais stops miles short of its nearer base, and that it rises from the Red Desert quite like other ranges of western Sonora, though to a loftier height than any neighbor. Through the polished pavement of black malpais the old trail is distinct as a line on a map; the larger pebbles and boulders have been thrown out of the way of wheels by generations of travelers, while the smaller are ground into the ashen sand; and at intervals not exceeding a few hundred rods the bordering pavement is broken by cross-shape pebble-piles marking the journey's end now of a youth, again of mother and child, elsewhere of two or three adult companions, but more commonly of the single traveler, as told vaguely by the size and form of the heap—all

grim reminders that among the pioneers the malpais was a favorite place for dying.

A DESERT STORM

The stock are breathed on the nearer edge of the malpais, amid passing showers; then pushed on (the lighter outfit gaining rapidly) toward Tule Pass. Meantime the clouds about the southeastern sub-range of Sierra Tule grow dense, while those on neighboring crests lighten; then the cloud-mass veils the sub-sierra to its base, and half an hour later sets slowly northeastward over Tule Valley toward the trail, so slowly that both outfits are across the malpais and in the western half of the Red Desert tongue before the tempest strikes.

A typical desert storm (though of exceptional severity) was this, and instructive in every aspect. While among the peaks the cloud-bank was about 3,000 feet high and flattened dome-shape above, five or six miles in diameter at two-thirds of the height, and three miles across at the level of the plain (the rain-lines seen in the lower third converging from both sides); and these proportions seemed to be maintained, save for slight flattening, as the mass drifted into the valley and grew in size. It was most orderly in behavior; its rate of advance—after its clinging hold on the sierra broke—was eight or ten miles an hour; and the roar of rain and wind on drifted sand and scattered mesquites was audible half an hour, ominous for half as long, before the storm was actually at hand. Steadily the rim of cloud-bank pushed forward, passed overhead, and eclipsed the entire heavens save the northeastern eighth; light sprinkles fell from it directly downward through still air at first, but grew heavier as they caught



"A tongue of the Red Desert."

the northeasterly air-drift; then rather suddenly—so quickly that prompt action was required to protect the wagon as the stock turned tail—the wind stiffened without changing direction, while the shower became a torrent; and ten minutes later a 35-mile gale was driving the drops in a nearly horizontal sheet above the dune tops, while the temperature fell from some 70° to about 35°, and small hailstones formed apparently within a dozen feet of the ground. Ten minutes more and the gale was down to a breeze, the torrent to a sprinkle; then the rearward margin of the cloud-bank drifted away before the continuing breeze, and the low-swinging sun shone brightly. The cloud-mass pursued its way toward Sierra Pinta, evidently meeting a misty cape already hung about its shoulders; with the conjunction there was much lightning and some audible thunder; then the vapor-bank spread along the range, and either melted away or drifted on northeastward. During the twenty minutes of continuous pour the precipitation was 1¼ or 1⅓ inches (estimated from catchment in water-pail, etc.); yet over the waste of drifted sand not a rill was formed, not a puddle was produced, not even a watery surface was seen save in the few "slick spots" (*i. e.*, alkaline silt patches) of the cowboys—the sand simply swallowed the flood like a sponge, and was visibly moist only to depths of 3 to 4½ inches.

The storm over, the outfit heads again toward the distant pass, though Moberly lifts his voice to tender (thrice over, in typical cowboy emphasis) a "bet that them there fellers let the mules break the tongue when the storm come up on em;" and a half hour later the Mexican gallops up, on a bareback mule with toes locked inside the forelegs, to verify the inference. So camp is made in a woodless spot (save for scattered creosote bushes), while "los gringos" turn back to make repairs and bring up the supply outfit to a point (about longitude 113° 33′) twenty miles short of that specified in the contract with Don Bartolo. It is the third night's stop, and the second "dry" camp on the old trail—though drenched blankets and hourly showers belie the vernacular designation for a desert camp.

THE WAY THROUGH TULE PASS

By daybreak of the 19th the wind shifts from southwest to northwest and grows chill, while gray clouds drive toward the dawn and crowd before the rising sun in a fashion more typical of deserts than of vaporous lands; and feed and water are transferred to the lighter outfit, while the supply team is turned back toward Santo Domingo—with a douceur to driver and aid, because they did no worse. The ancient trail forward is a deep furrow in the sands, and as these grade into the silts of the valley-margin toward Tule Pass the furrow becomes a series of sections of arroyos, normally setting obliquely across the trail, but diverted for rods or furlongs by the deeper cut of the wagon-way; and within five miles the arroyos bear marks of having run brimful for minutes or hours with the overflow from the sierra on the south. Gradually the way rises through sheetflood-carved footslopes, and then winds among buttes and granite walls toward an ill-defined divide; graves grow numerous again with the abundance of rocks to mark them; the year-old trail of an American on a shod horse and a Mexican on a shoeless beast forms a clear palimpsest over the 7-year-old tracks of the boundary parties; sign of deer and mountain sheep in pairs and flocks abound in the gulches, while coyote paths (unseen in Tule Desert) reappear. The pass is a meadow-like expanse of coarse granitic sand filmed with scrubby creosote clumps; here the trail divides, and a guide-post of sawn timber stands, soli-

tary and incongruous, to attest observance of a territorial law by the road supervisor of Yuma County—and incidentally to indicate "Tule Well" and advertise the name and wisdom of the last passer (the American horseman) in the feeling inscription "Agua Salada 75 miles—go back and fill your canteen. G. O. Taylor." Thenceforward the way is freshened and the mules heartened by the year-old trail of the conscientious supervisor.

Tule well (longitude 113° 45′) is a mile or two from the main trail; it is now a name on map and tongue, and a caving pit in rocky detritus with a barrel of liquid at the bottom—liquid even more saline than that of the Gulf, in addition to its overpowering flavor of copper salts and strong tinctures of sodden insects and drowned rodents, from which even the thirstiest horses turn in wry aversion. In the palmy days of the Old Yuma Trail this was a way-station, as adobe ruins still proclaim; before the range was overpastured there was a slender flora which helped to hold moisture, and the water was made tolerable by constant draughts and renewals; now it is but an echo and a delusion, if not a poison-brew for the chance traveler. A league west of the old well and a mile from the main trail there is a high tinaja (water-pocket) in the granite range running down from Blackhead Butte (Cerro de la Cabeza Prieta), in which water may be found by a hard climb in winter and spring or after local storms; but the chance is a desperate one during most of the year.

Beyond the main amphitheater of Tule Pass the trail winds among granite buttes, sierras, peaks, knife-edge crests in bewildering variety and labyrinthine confusion; gray and cream, pink and rosy walls of solid granite rise sheer from flat valley-floors of crumbled granite; the way wanders through a two-mile rincon—a great natural corral—of granite walls, in which a city might be housed against cyclone or armed invasion; whole cubic miles of granite are constantly in sight—yet all this granite is but as a hand-specimen of northwestern Sonora and adjacent Arizona.

THE VALLEY OF LITTLE LETTUCE

Eight miles west of Tule Pass the rugged mass of Tule Mountains falls away, first on the left and then on the right, giving place to zones of malpais which slope down to Lechuguilla Valley; and here again the ancient trail is a thread of yellow in a field of black. Here, too, the narrow cemetery of the Old Yuma Trail grows more populous, for here the desert is most drear and water most distant; the grave-marks are too many to note—save the 30-foot circle of pebbles with a great pebble cross in the center recording the thirst-death of a family of seven who staked life on a demijohn of water which was accidentally broken. Captain Gaillard pictures this "cementeria," and adds: "The wagon tracks made when the poor Mexican drove his exhausted team to one side of the road were plainly visible thirty years afterward, and at the very spot still remain pieces of glass and wicker-work from the broken demijohn, and the skulls of the two horses." The sun swings low as we pass this pathetic memorial and others on the desolate malpais; and as it sinks behind Sierra Gila we push out a mile or two on the silty plain (longitude 113° 55′) and make the third "dry" camp, where the team-mules drink the last of the water, where ablution is not, and where the slender store of hay and grain comes to an end. But the blankets are still damp and the night is chill—than which there are worse things in desert life.

Lechuguilla Valley is named from an inconspicuous agave-like plant of three or four slender straggling stipes a few inches high; it affects chiefly the roadway and arroyos, leaving the glaring

"Looking down on threescore cross-marked graves."

silts to wide-scattered tufts of creosote and rare mesquites; and on this waste, with its speck of slow-moving outfit, rises the sun of the fifth day from Santo Domingo, the fourth from the "last water." The Gila range unfolds into another labyrinth of granites; but it is not until high noon that we draw up the sheet-flooded incline (with wheels grinding anon on granites like those of the crests) and pull up the short arroyo to the classic spot of the old trail—las Tinajas Altas (the high tanks, longitude 114° 5′). Here, thirty miles from the nearest habitation, and looking down on threescore cross-marked graves—and how many unmarked no man can tell,—we find the outfit of a hunting party (now absent on the chase), and after drinking deeply at the lowest basin fare sumptuously on their spoil.

THE HISTORIC HIGH TANKS

Las Tinajas Altas are a series of water-pockets (partly pot-holes, partly cataract pools) worn in the gulch bottom by torrents following the rare storms of the region. The lowest and largest is confined partly by great boulders and granitic débris, and is reached by stock; 100 feet of finger-and-toe climbing over smooth rock leads to two others, and in 50 feet more there is a third; still higher one of the party climbs to a fourth, and thence on to the tenth, stopping at a smooth slope apparently leading to the eleventh basin holding water the average year round—"Old the Taime," in the quaint spelling of the Yuma supervisor on a guide-board seven miles away. The climb was made partly to examine the Indian mortars ground in the ledges and great boulders about every pool—mortars numbering hundreds if not thousands, some but a few decades old, but most so ancient that the polished bowls rise high above the unpolished rocks around them—mortars recording the visits of uncounted generations of devotees, to whom each laboriously-wrought basin was at once symbol of and invocation for precious food and life-giving water. One boulder bore 40 pits in its upper face, another 28; and up to the highest tinaja reached they are found in corresponding profusion. Most of them must have antedated Padre Kino, who passed this way just two centuries ago and mapped route and "Tinaxa" in 1702; and most of the others must have witnessed the long

procession of pioneers who trod the Old Yuma Trail to make California—and then watched the gradual settling of present desolation.*

Besides their historic interest, the high tinajas present problems in geology and in meteorology; but it may be noted merely that they lie on the lee side of a rugged range, the first to catch the humid air-drift from Gulf of California, and that their catchment gulch divides exceptionally long spurs of the narrow sierra.

Six miles north of Tinajas Altas the fifth camp-fire is lighted, and the team-stock revel in corn-meal while the saddle animals experiment suspiciously with hardtack and other man-feed; for the breakdowns of the supply outfit cost a day in dearly borne provender as well as in time.

"The lowest and largest is confined partly by great boulders and granitic débris."

The next—and last—day is a hard one for the beasts, since the way skirts the lower slopes of a plain (alluvial in the valley bottom, but sheetflood-carved above), over which the waters from a local storm in the mountains flowed yesterday—flowed not in coalescing streams such as gather on humid soils in humid air, not in the continuous sheetflood formed when soil and air are of the dryness normal to the desert, but in a plexus of interlacing rivulets uniting and dividing every few yards or rods, and digging little arroyos across the trail to the average number of a hundred per mile. Into these the wagon plunges and out of them it is pulled by the fagged mules hour after hour, until the breaks of Gila River give respite. From daybreak onward Castle Dome

*Kino's map is "Tabula Californiæ Anno 1702. Ex autoptica observatione delineata à R. P. Chino è S. I." The padre's cartography, but not his orthography, has been followed in many if not most later maps of the region.

The colloquial rendering of the name introduces the local laison—it is lumped as Tinahaltas (vowels Spanish).

looms on the northern horizon 70 miles away, and plays with passing cloudlets made and unmade in swift succession; but the turreted volcanic mass just beyond the Gila (christened "Klotho's Temple" by Mr. Gill*) is more anxiously scanned as a landmark of growing promise. Even before midday stock trails—the first seen since leaving the Sonoyta range—begin to appear. In midafternoon a stray cowboy is spoken by Carroll; but it is long after nightfall of the sixth day from Santo Domingo before the animals are comforted with hay and barley from the single store in Gila City.

* Eight or nine miles east of Gila City; latitude 32° 46′, longitude 114° 14′, altitude 1,800 feet.

A LESSON OF THE TRAIL

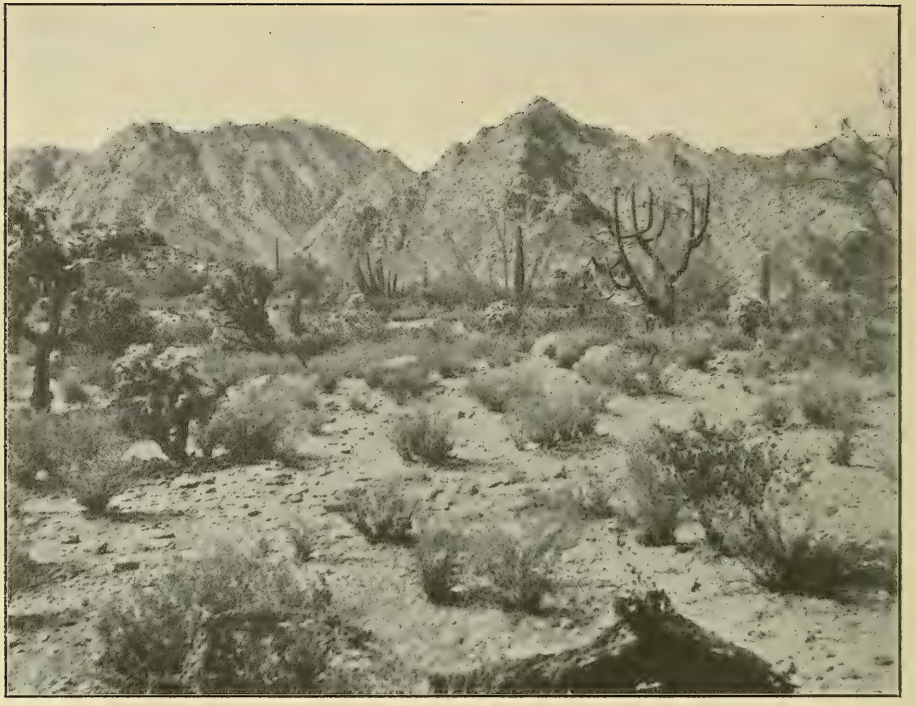
No traveler over the Old Yuma Trail can fail to feel the incongruity of its present condition with its past history. It is the way of the western world to grow in population and wealth, to increase in industrial and intellectual tension; yet most of this ancient way is peopled only by graves, enriched but by memories, nearly as lost to labor and to thought as the sand-tombed cities of Arabia and farther Turkestan. The routes of Cabeza de Vaca and de Soto and Coronado are gone save to delving historians, the trans-Appalachian roads of our own grandsires are largely forgotten, many of the trails of the argonauts are effaced beyond retracing; but America probably presents no other lapse

"The turreted volcanic mass . . . christened 'Klotho's Temple' by Mr. Gill."

from populous activity to utter desert so complete as that of the zone trodden by padre Kino and five generations of followers—and the lapse seems the greater because so uncharacteristic of occidental progress.

There was reason enough for the abandonment of the old route as a line of travel and traffic; the increasing safety of shipping first invaded its claims, the partition of Mexico next curtailed its functions, and the railways spanning the continent finally tapped its reservoirs at both termini; yet the factors leading to the abandonment of the route only partially explain the desertion of its purlieus, and serve rather to fix attention on the fact that the entire zone traversed by the trail was gradually impoverished by the long-continued—and short-sighted—overtaxing of its meager resources. When the earliest Caucasian pioneers came, they found the province peopled sparsely with semi-migratory Papago Indians, who wandered afar in search of water, located fields and villages even by the temporary wettings of chance storms, and erected shrines about the more permanent springs and tinajas—Tinajas Altas among others. They also found a fauna of deer and antelope and bighorn with their carniverous consociates, as well as birds, rodents, reptiles, and insects in wide variety and moderate abundance; and as the basis of the motile life they found a varied flora delicately balanced between hard habitat and dependent fauna through eons of adjustment. True, the aggregate vitality was but a fraction of that characteristic of humid lands; yet the deficiency was partly made up by a longer individual life and a closer vital economy growing out of the exceptionally perfect solidarity characteristic of the living things of arid regions, so that the sum of living resources was sufficient for reasonable demands. Two or three generations of Caucasians drew on these resources in the easy way of restful latitudes without serious detriment; the missionaries and couriers followed tribesmen's trails to tribal domiciles, and shared water and food with or without material exchange; their animals found forage in grassy and shrubby spots, while they were able to take game or gather cactus fruits in season with little effort; and so long as they were few, the vital balance established through eons of earth-making was little disturbed. With the third or fourth generation and the gradually increasing numbers of Caucasian travelers, the resources began to suffer; the forage grew scant, the wantonly harried cacti withdrew from the nearer borders, the big game became wary and betook to other ranges; with the decimation of plants and the trampling of stock the soil grew less retentive of the scant moisture, in a ratio probably higher than that following deforestation of humid lands, so that the meager ground-water disappeared, the smaller springs went dry, and the chance tempest brought bane rather than the boon of the olden time; and with each decade of vital degradation the Papago tribesmen withdrew to remoter haunts, or else degenerated into a parasitical dependence on the wells and wastage of the whites. Still the natural balance was not utterly destroyed until the Anglo-Saxon came with that intense energy which balks at no obstacle, brooks no delay; he deepened old wells and dug new to catch the last drops of dwindling ground-water; he not only drove herds to devastate the enfeebled flora along the way, but stocked the adjacent ranges with cattle and sheep to supply the needs of multiplying travel; and he stopped only at the fortunate conjunction of railway-making on more northerly lines with the utter eradication of the grasses and other forage plants along the old route, and the consequent extinction of the useful fauna and destruction of the minor waters.

The American desert stands apart from



"Plains still mantled with herbage and grazed by herds of deer as in pre-Columbian times"

that of the Old World in superior vitality; with corresponding conditions of climate and soil, a peculiar flora of leafless, thorny, waxy-skinned, light-utilizing forms, and a distinctive fauna take the place of lifeless sand, and the characteristics of fauna and flora combine with several lines of geologic evidence to prove that the arid provinces grew slowly during several periods, running at least from the early Neocene to the present. It was during these periods that the unparalleled solidarity of our desert life was gradually developed;*

*As pointed out elsewhere, this solidarity matured on certain lines in agriculture and concomitant zoöculture in the very province traversed by the ancient route. Cf. "The Beginning of Agriculture," American Anthropologist, vol. VIII, 1895, pp. 350-375; "The Beginning of Zoöculture," ibid., vol. X, 1897, pp. 215-230.

from age to age the forms and forces of animal and vegetal life coöperated in common strife against sun and sand, and were forced by the hard environment into a harmonious interrelation in which none could dominate without risk of starvation, none yield unduly without certainty of extinction. Into this complex mechanism the prehistoric forbears of the Papago insinuated themselves so gently as scarce to disturb the relations of parts; into the same mechanism the Papago themselves pushed their way harmlessly when driven into the outer deserts; but the natural interrelations were too delicate to withstand the violent entry of the Anglo-Saxon, and the weaker organisms withered before him. Other provinces have suffered from the brash vigor of Caucasian conquest; forests have been sacrificed and

woodlands despoiled into sterile wastes; fields have been ill-wrought into barrenness and then turned out to wash into neighboring waterways, thereby ruining both hill and dale; mines and quarries have been so unwisely worked as to check other industries for decades and entail public losses far exceeding personal gains. In legion ways the adjustment of American settlers to new environments has been destructive, yet no new contacts have been more disastrous than those between the pioneers from humid fatherlands and the finely-balanced vital solidarities of arid regions; and of all the examples of destructive contact between pioneers and precursors none are more impressive than those so clearly attested by the Old Yuma Trail.

Happily, the dark lines of the picture carry a brighter complement: Science—and American progress is but science practically applied—advances through experiences, both of success and failure; no success could be more instructive than the failure attested by the abandonment of the country along the historic route; and this failure at once attests the folly of disregarding natural conditions when settlement is pushed into unfamiliar regions, and indicates the wisdom of weighing natural conditions as means of nature-conquest. The natural potentiality of the country traversed by the old trail is proved by the condition of the neighboring plains on the southern side of the Sonoran boundary which have never been overstocked—plains still mantled with herbage and grazed by herds of deer as in pre-Columbian times; and the slow resetting of shrubbery along the old way gives definite promise of restoration to the early state, while the moderate fruitfulness of the Sonoran plains points a way in which the growing resources may be utilized by patient adjustment of industries to natural conditions.

So the wisdom, if not the imperative necessity, of adjusting means to conditions in the reclamation of arid lands is the leadling lesson of the Old Yuma Trail.

ADVANCES IN GEOGRAPHIC KNOWLEDGE DURING THE NINETEENTH CENTURY*

By Brig.-Gen. A. W. Greely, Chief Signal Officer, U. S. Army

In these days geographic exploration means not merely the topographic distribution of mountain or river, of lake or plain, but also the determination, in a cursory manner at least, of existent vegetable and animal life, of climatic conditions, and especially of the ethnology of inhabited areas.

In forecasting the evolution of any aspect of the twentieth century the soundest base must be the advances of the nineteenth century along like lines of research. Judged by this standard, the present century will perfect the aspirations of the explorer of the last century to make known the entire surface of the earth. Few appreciate the enormous advances in geographic knowledge dur-

* Revised and republished by courtesy of the publishers of the *New York Tribune*.

ing the last one hundred years, which may be summed up in the general statement that fully 60 per cent of the world's land area was unexplored in 1800, while scarcely 10 per cent now remains unknown.

At the commencement of the last century the four greatest geographic problems were the Northeast Passage, the Northwest Passage, the sources of the Nile, and the North Polar quest; the last only remains.

ONE ARCTIC PROBLEM SOLVED

The Northwest Passage first yielded its secrets to the energetic explorers of this age, the result being attained by a series of voyages, almost entirely under British auspices, that are unsurpassed in number, duration, and heroism. Attempts for a Northwest Passage, interrupted by the death of the great navigator, James Cook, who lost his life therein, were renewed owing to the success of William Scoresby, Jr., in exploring East Greenland, 1817–'22. Prosecuted both by land and sea, material advances came through Parry, Ross, and Franklin, 1819–'35, while the voyages of Austin, Belcher, Collinson, McClintock, McClure, Rae, and others in search of Franklin, 1845–'59, completely solved the mystery.

Parry, in three notable voyages, explored the greater part of the islands and waterways north of America half way from Baffin Bay to Bering Strait, passing north of the magnetic pole. John Ross explored the Felix Boothia Peninsula, the north point of the continent of America, while his lieutenant and nephew, James C. Ross, located the north magnetic pole at Cape Adelaide, 70 degrees 5 minutes north, 96 degrees 44 minutes west. The north coasts of America were outlined by the land journeys of Franklin, Beechey, Dease, and Simpson, 1819–'46, from King William Land west to Point Barrow.

Other notable advances have been made in Arctic America by Inglefield, Kane, Hall, Nares, and Greely in Grinnell Land and Northwest Greenland; by Drygalski, Geisecke, Garde, Holm, Steenstrup, and other Danes in Western Greenland; by Scoresby, Graah, Koldewey, Payer, Nordenskjold, Garde, Clavering, Holm, Ryder, and Peary on the east coast, while Nansen and Peary have crossed the inland ice, the latter to the extreme southeastern point of the new land to the north of Greenland, discovered by Greely in 1882.

ADVANCES TOWARD THE NORTH POLE

Spitzbergen has been fully explored by Gaimard, Nordenskjold, Torrell, Leigh Smith, and Conway. Weyprecht and Payer discovered Franz Josef Land, whose limits have been extended and defined by Leigh Smith, Jackson, Nansen, and Wellman. De Long drifted from Bering Strait to the New Siberian Islands, and Nansen's extraordinary continuation of De Long's drift around Spitzbergen has most materially advanced our knowledge of the Siberian and Polar Seas.

Advances toward the North Pole have been made through the exertions of Scoresby, 81 degrees 30 minutes north; Parry, 82 degrees 45 minutes north; Nares, 83 degrees 20 minutes north; Greely, 83 degrees 24 minutes north (the most northerly land as yet); Nansen, 86 degrees 14 minutes north, and Abruzzi, 86 degrees 33 minutes north, within 207 geographic miles of the Pole.

As to the Northeast Passage, Nordenskjold, having faith in both its scientific value and practicability, selected Palander as his navigator. Sailing from Tromsö in 1878, they passed Kara Sea successfully and readily rounded the north cape of Asia. Beset by ice and obliged to winter within 120 miles of Bering Strait, Nordenskjold com-

pleted the circumnavigation of Asia in 1879.

Within the Antarctic circle, to the south of Patagonia, Palmer, Bellinghausen, Biscoe, Larsen, and Gerlache discovered Palmer Land and adjacent islands. To the south of New Zealand Belleny found islands, and James C. Ross added to his arctic laurels by discovering ice-clad Victoria Land, with its flaming volcanoes, and in locating the south magnetic pole. South of Kerguelen is the Enderby Land of Biscoe, while southeast of Tasmania an archipelago of desolate islands, located by Wilkes and D'Urville, marks the northern limit of ice-clad Antarctica.

EXPLORATION OF AUSTRALIA

The greatest southern confederacy, Australia, has a European population exceeding five millions; but in 1800 its two thousand settlers did not even have a country with a recognized name. As New Holland, it appeared on the best maps, a featureless central area, with its outlined coast largely conjectural. Surveys of the coast, begun by Bass and Flinders, were finished by King, 1822; Wickham and Stokes, 1837–'43. Inland, Hughes solved the hydrographic problem of the Murray watershed, Eyre traced the south coast along the Great Australian Bight. The central desert was made known by Mitchell and Sturt, while Grey and Gregory explored in the northwest and Leichardt and Kennedy in the northeast. The most fruitful journey was that of Stuart, 1858–'62, from the inhabited south coast to the extreme north, which opened a fertile, well-watered district to colonization. The western desert has been explored here and there by Forrest, Warburton, and Giles, the last named having twice traversed the great Sahara, east and west.

New Zealand first came to our knowledge by missionary labors, 1814–'30, and later by commercial extensions and gold-hunting. New Guinea has been explored in the last half century by Wallace, Meyer, Forbes, Von Schleinitz, and Dallmann.

OPENING UP SOUTH AMERICA

Of the Americas, the longest known is least explored. South America, however, was fortunate in the beginning of the century, 1799–1804, with such investigators as Humboldt and Bonpland, who traversed Venezuela, determined the remarkable bifurcation of the Orinoco, visited Magdalena, Quito, and the volcanoes. This journey was not only locally important, for it gave an extraordinary impulse to the comprehensive study of the earth. Von Eschwege, Von Wied, Saint-Hillaire, Spix, and Martius explored the interior of Brazil from the Amazon Basin; D'Orbigny and Castelnau devoted themselves to the geography of the central regions between the Rio de la Plata and the Amazon; Darwin, Wilkes, and Gillis explored the coast lines of the continent; Wallace and Bates did wonderful scientific work in the Amazon Basin, followed by Agassiz and a host of other explorers. Of the tributary basins of the Amazon, Steinen has mapped the Xingu, Church the Madeira, Chandless and Labre the Purus.

In the Guianas Schomburgk's researches are the most valuable. In late years the most important explorations are doubtless those of the French international polar expedition at Cape Horn, under Martial.

PATHMAKERS IN NORTH AMERICA

Of the continents none other has so benefited by the explorations of last century as North America. To the genius, tact, and energy of Humboldt was early (1804) due modern geographical knowledge of Spanish America, which was

materially increased by the explorations of Pike from St. Louis to Chihuahua, *via* the Kansas, Arkansas, and the Rio Grande.

Kotzebue and Zagostin in the first half, and Dall, Kennicott, and Allen in the last half, of the century have outlined the general features of Alaska. In the Stikine, Klondike, Tanana, Nome, and Koyukuk regions the gold hunters have explored thoroughly. In Canada the early discoveries of Franklin, Richardson, Rae, and Back have been supplemented by Petitot in the Mackenzie Basin, Dawson and Ogilvie in the Yukon watershed, Bell and Tyrrell around Hudson Bay, Boas in Baffin Land, and Low in Labrador.

As regards the United States, the country west of the Mississippi was almost entirely unknown in 1800. The early trans-Mississippi explorations form one phase of the history of the United States Army. The most fruitful in results of such journeys is that of Lewis and Clarke (1804–'06). They ascended the Missouri from mouth to source, crossed the continental divide, traced thence the Snake and Columbia to the ocean, and returned *via* the Yellowstone. For the first time the United States was crossed from the Atlantic to the Pacific. This demonstration of the practicability of overland travel was an essential factor in the occupancy of Oregon, which gave the first foothold for the American on the Pacific Coast.

MAPPING THE GREAT WEST

Pike explored the valleys of the upper Mississippi, Arkansas, and Rio Grande, crossed part of Chihuahua and Texas, then unknown countries. Bonneville (1832–'36) explored the valleys of the Platte, Green, and Yellowstone, and, pioneer of the Oregon trail, twice crossed to the Columbia, passing west *via* the Snake River, the Grand Ronde, and Blue Mountains. He also made known the great basins of Salt Lake and Humboldt River and the pass across the Nevadas to the Sacramento. Bonneville first correctly charted the hydrography of the trans-Rocky Mountain regions, and eliminated the Rio Buenaventura and other mythical streams. Frémont's journeys were important as initiating an extensive series of scientific explorations. Kearney surveyed the boundaries of Texas and Louisiana, Boone the country between the Arkansas and Canadian, and Emory from Leavenworth to San Diego *via* the Arkansas, Del Norte, and Gila.

Among the many expeditions may be mentioned that of Simpson to the Navajo country, Stansbury to Salt Lake, Sitgreaves to the Zuñi and Colorado Rivers, and Mullen from Walla Walla to Fort Benton. Important surveys are those of the Pacific Railway route by McClellan, Whipple, Parke, Williamson, and Derby; the Mexican boundary by Emory, the northwestern boundary (1857–'61), and in later years those of King, Hayden, Powell, and Wheeler, which have elucidated most of the geographical problems in the United States.

RIVALRY IN ASIA BEGAN EARLY

In the geographical as in the political evolution of Asia the potent forces have been Great Britain and Russia, so that Northern and Southern Asia have been almost separate fields of enterprise for the dominant nation, with Central Asia as debatable ground for rivalry by both nations. In Northern Asia explorations in the early century were confined largely to the local extensions of knowledge, except additions to the New Siberian Islands by Samkif, Sirovatskof, Hedenstrom, and Sannikof, 1805–'11; of the Siberian Ocean by Wrangell and Anjou, 1820–'23, and in Nova Zembla by Lütke, 1821–'24; Pachtussow, 1832–'35, and Baer and Zivolka 1837–'38.

The foundation of the Imperial Russian Geographical Society in 1845 gave impetus and direction to Asiatic discoveries, increased knowledge of the Russian Empire being the aim. From 1849 to 1857 Hoffman, Aksakof, and others explored the Ural region and the ethnographic features of Russia proper and of Western Siberia. Extending in scope from 1857 to 1871, besides Siberian researches in Amur, Usuri, and Saghalin, the Caucasian and Aral-Caspian regions were explored in the southwest, while to the east many expeditions entered Turkestan, Manchuria, Khorassan, and Mongolia.

Between 1871 and 1885 Central Asia, Mongolia, and Western China were explored, largely through Prjevalsky, and international polar stations were established on the Lena and in Nova Zembla. Severtsoff and Fedchenko explored Turkestan minutely; the deserts of northwestern Siberia and Lake Baikal were examined and a sea route opened from Tobolsk by way of the Kara Sea to St. Petersburg.

TIBET IS A MYSTERY YET

During the last fifteen years attention has been paid to Caucasia, Turkestan, the Amur, and Black Sea regions. In these years perhaps the most interesting explorations are those of Hedin, who crossed the desert of moving sand hills between the Yarkand and Khotan Rivers, outlined the northern rim of the great Tibetan Plateau, and examined Lob Nor Basin.

Explorations in Southern Asia originated in the desire to extend inland the sphere of British influence. Political considerations speedily entered into the problem, and those barriers proved more difficult to surmount than physical obstacles. In reaching the Himalayan foothills, and later in passing across the ranges into Afghanistan and Tibet, the explorer necessarily awaited brief intervals in the wars of conquest and occupation.

Manning succeeded in entering Tibet in 1811, but was soon expelled. Non-intercourse was so rigidly enforced that the British surveys had recourse to selected native agents, and most of the early advances were made through secret journeys of pundits, among whom Chandra Das stands foremost. As usual, much has been learned by missionary labors, especially in Tibet, through Huc and Desgodins, the latter also contributing much to a knowledge of Indo-China. In recent years both countries have been explored by Rockhill, Bonvalot, Littledale, Szechenyi, Henri of Orléans, and others, especially the pundit Nain Singh, under conditions that leave much to be added.

Japan has opened her unknown empire to the world. While much has been done by Japanese travelers to make its geography known, yet the geological researches of Naumann should be noted.

MAP OF AFRICA FILLED IN

The extent to which exploration changed the map of Africa during the nineteenth century is known only to professional geographers. It is true that in 1800 the entire coast of Africa was known with some definiteness through the exertions of Portuguese navigators in previous centuries. Yet apart from the valley of the Nile geographic knowledge of the interior was confined to a scant hundred miles southward from the Mediterranean and northward from the Cape of Good Hope and to the estuaries of the Zambezi, Kongo, and Niger.

Geographic knowledge stopped almost within sight of the sea or the Lower Nile. Scarcely fifty years since there appeared, from 5 degrees north to 10 degress north, on the best maps of Africa, the legend, "Kong Range, mountains supposed to extend across

the continent." Today it is known that this central area forms part of the great Kongo Basin, with a population of more than forty millions.

In outlining the march of exploration toward the interior of the "Dark Continent" only the most succinct account is possible. For clearness of statement, explorations are treated under five general heads: First, trans-Saharan, from the Mediterranean; second, the Niger regions; third, the lake regions near the Upper White Nile; fourth, the Zambezian region, and, fifth, the Kongo Basin.

According to different definitions of a desert, the Sahara varies in area from 2,500,000 to 3,500,000 square miles, of which the eastern third is generally known as the Libyan Desert Hitherto this desert area, with scant water, intense heat, and whirling duststorms, interposed an inaccessible barrier between the Hemitic nations of the Mediterranean coast and the negro tribes of the Sudan.

SAHARA'S BARRIERS OVERCOME

Explorations of the Sahara were fruitless until Oudney, Denham, and Clapperton crossed (1822–'24) from Tripoli to Lake Chad, in the Sudan. Laing, following, crossed from Tripoli *via* Ghadames and Tuat to Timbuktu, the mysterious city of strangely exaggerated importance from previous centuries. Panet, Vincent, Duveyrier, and Lenz explored the desert between Senegal and Southeastern Algeria.

It was Barth who gave the first definite account of the Saharan region after a journey of great extent and importance. Starting from Tripoli, he crossed the Sahara to Lake Chad, passed Northern Hausaland to the Niger at Say, and thence reached Timbuktu. Returning northeast through Sokoto to Kukawa, he explored Bornu. Barth's journeys were of great value, for he not only made known to the world the existence and accessibility of hundreds of thousands of square miles of fertile territory, but he also gave in five volumes an enormous amount of geographical information, in which he treated quite thoroughly the ethnology of the various tribes of the Central Sudan. His successor, Rohlfs, after exploring Southern Morocco, penetrated the Sahara to the oases of Tuat and Ghadames, and those of the districts of Fezzan and Tibesti. He then crossed from the Mediterranean to the Guinea coast *via* Bornu and Lagos, on the Niger, the first European to make the journey. Later (1873–'78) he explored the oases in the Libyan Desert.

The Sahara, instead of being a low desert of marine origin, is an elevated plateau, which has been enormously denudated by the disintegration of its rocks through temperature changes and the distribution of its dust by high winds. It is not entirely rainless; has many fertile oases and only needs abundant water to produce luxuriant vegetation.

The first Europeans to cross Africa from east to west north of the equator were Matteucci and Massari, who traveled from Suakin *via* Kordofan, Wadai, and Kano to the Niger. Nachtigal (1869–'70) made a journey from Tripoli *via* Fezzan to the Libyan Desert, where he explored the remarkable mountainous region of Tibesti. Examining the Lake Chad district, he reached Egypt *via* Wadai and Darfur.

NIGER AND NILE AN OPEN BOOK

The mystery of the Niger, long erroneously supposed to flow through the Sudan to the west, was partly solved by Mungo Park, who, starting from Gambia, in his first journey reached Segu, on the Niger. His second expedition (1805) ended in failure. Clapperton, renewing the survey, perished, but his faithful assistant, Richard Lander, definitely solved (1830) the mystery of the

Niger by descending from Bussa to the mouth of the stream.

French energy has explored Senegal and Gambia by the journeys of Rubault, Mollien, De Beauford, and especially Caillié.

The great mystery of the Nile sources, after twenty centuries of speculation, has been solved by the labors of various explorers, most largely by Baker, Speke, and Stanley. Its largest lake source, Victoria Nyanza, was discovered by Speke, who missed Albert Nyanza. Baker discovered the source of the Blue (Abyssinian) Nile and the Albert Nyanza of the main or White Nile. To Stanley belongs the honor of the discovery of the remotest source, Albert Edward Nyanza, which feeds the Albert Nyanza through the Semliki River.

The fabled Mountains of the Moon have given place in Eastern Africa to a most remarkable lacustrine system. The vast equatorial lakes cover extensive regions, feed some of the largest rivers of the world, and by their transportation facilities favor commerce. Their central situation between the Cape and Cairo, convenient to the Indian Ocean and on the confines of the Kongo Basin, caused them to be recognized as the central key to African domination by Germany and Great Britain, who now control the region.

The largest lake, Tanganyika, was discovered by Burton, while Livingstone contributed Nyassa, Moero, Bangweolo, and others. Joseph Thompson, exploring south from Tanganyika, discovered Lake Rukwa and also traversed unknown Masailand.

LIVINGSTONE'S GREAT WORK

The discovery of the equatorial lakes was of subordinate import to that of the Kongo Basin, which grew out of missionary labors in South Africa. To the genius and energy of two men, David Livingstone and Henry M. Stanley, are primarily due the exploration and utilization of the vast unexplored regions between the Sudan and the Orange River.

Unquestionably the missionary Livingstone, who settled in Bechuanaland in 1841, was one of the greatest of African explorers. First discovering Lake Ngami, he turned his attention to the Zambezi Valley, and practically covered this basin in 1851–'56, and later, in 1858–'64, explored Lake Nyassa and the adjacent country. Most important results flowed directly and indirectly from the last journeys of his life, in 1866–'73, when, crossing the watershed to the very sources of the Kongo, he discovered Lakes Moero and Bangweolo, the Luapula and Lualaba Rivers, now recognized branches of the Kongo.

STANLEY

Stanley, who found the long-lost Livingstone, completed the exploration of the main Kongo Basin in a journey (1875–'78) which in its discoveries and results is unequaled in African exploration. His circumnavigation of the great lakes, Victoria Nyanza and Tanganyika, was important, but the crossing to the watershed of the Lualaba, which he proved to be the Kongo by following it to the Atlantic Ocean, was a journey of unsurpassed courage, persistency, and resourcefulness. His return to found the Kongo State was followed by extensive discoveries, such as Lakes Leopold and Mantumba, the Ubangi, Kasai, and other affluents of the mighty river. Stanley's geographic laurels were increased by his search for Emin Pasha, when he crossed Africa from the junction of the Kongo and the Aruwini over the Bantu borderland. He discovered not only an extensive and almost impassable forest, but also the ultimate lake source of the White Nile, Albert Edward Nyanza.

Stanley's exploration of the Kongo Basin was a potential force, second only

to that of Columbus' discovery of America. Each explorer opened up a new continent, and gave rise to scientific and philanthropic schemes which affected the progress of the world.

Europe awakened to the importance of the Kongo Basin, with its great lakes, its ten thousand miles of navigable rivers, which leave no part of the basin one hundred miles distant; its fertile valleys, its animal life and vegetable resources, and its millions of inhabitants. Africa speedily became the center of commercial exploitation, which was not confined to private enterprise. Most fortunately, by act of international conference the Kongo Free State, with an area of nearly a million square miles, became independent. Presenting the greatest natural possibilities, it practically bears, in interest and importance, the same relation to Africa as does the watershed of the Mississippi and its tributaries to the United States.

By rail and steamboat one now travels from the west coast, through the Kongo State, more than half way across Africa. Its revenue is counted by tens of millions of francs, its exports and imports increase steadily, and, apart from the 12,000,000 inhabitants of the French Kongo, it has a population of 30,000,000. The effect of the geographic evolution of Africa upon Europe may be estimated by the statement that Belgium, in its relations with the Kongo State, deals with a country whose area is one hundred times its own, and that of the 11,500,000 square miles of Africa all but 500,000 are European dependencies.

OCEANOGRAPHY A NEW ART

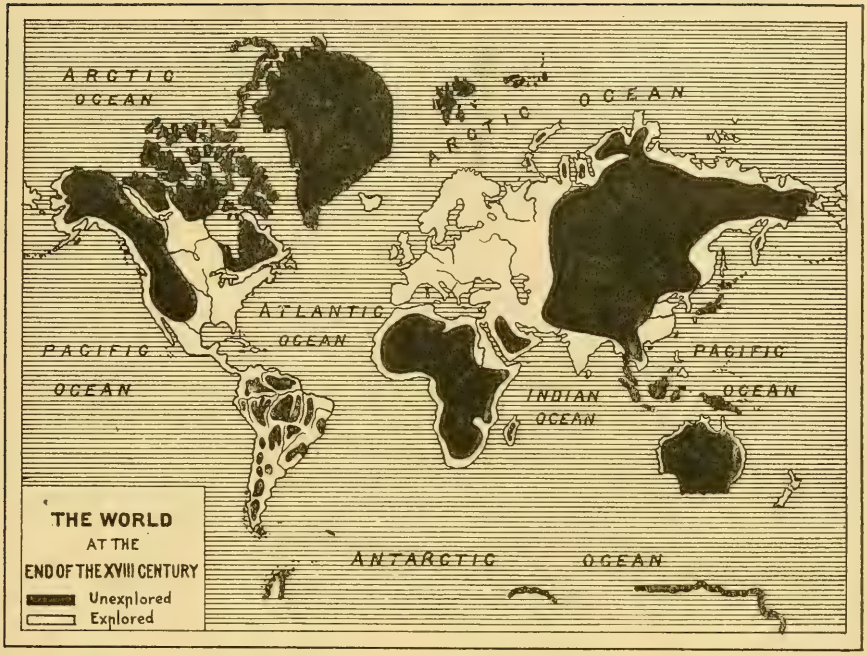
As to oceanography, a development of the nineteenth century, space only permits allusion to the work of Sigsbee, in the Gulf of Mexico; Carpenter, Thomson, and Norwegian savants in the North Atlantic, and Nares and Murray in the *Challenger* expedition. The latter work, under Murray's exposition, has outlined the main features of the oceanic world for the twentieth century to explore and chart in detail.

As to the twentieth century, it should be noted that pioneer discoveries are yielding steadily to scientific explorations. Future work will trend toward the outlining of existent and possible relations between man and his geographic environment. In this sense there remain numerous geographic problems whose satisfactory solution will tax many generations of scientific explorers. Such, for instance, are current investigations as to the acclimatization of Europeans in tropical Africa and the distribution of underground streams in the arid regions of Australia and the United States.

Reverting to pioneer discoveries, the twentieth century, despite unceasing efforts of this age, inherits an extensive legacy of unknown lands. Exploration for exploration's sake will for many years find ample scope in untraversed polar regions, Arctic and Antarctic, where the attainment of the Poles will continue to be largely the end in view.

Of unexplored areas West Australia now presents the most extensive, its vast desert having been examined only here and there along routes hundreds of miles apart.

While North America has large, vaguely known districts only in Mexico and Central America, yet South America presents many fields of great promise to adventurous men. This is especially true of the eastern slopes of the Andes in Ecuador, Colombia, and Brazil. In the western half of the drainage basin of the Amazon exploration has touched only the banks of navigable streams. Our knowledge is largely conjectural as to the extent and distribution of its forests and upland and of the existent conditions of its fauna, flora, and inhabitants.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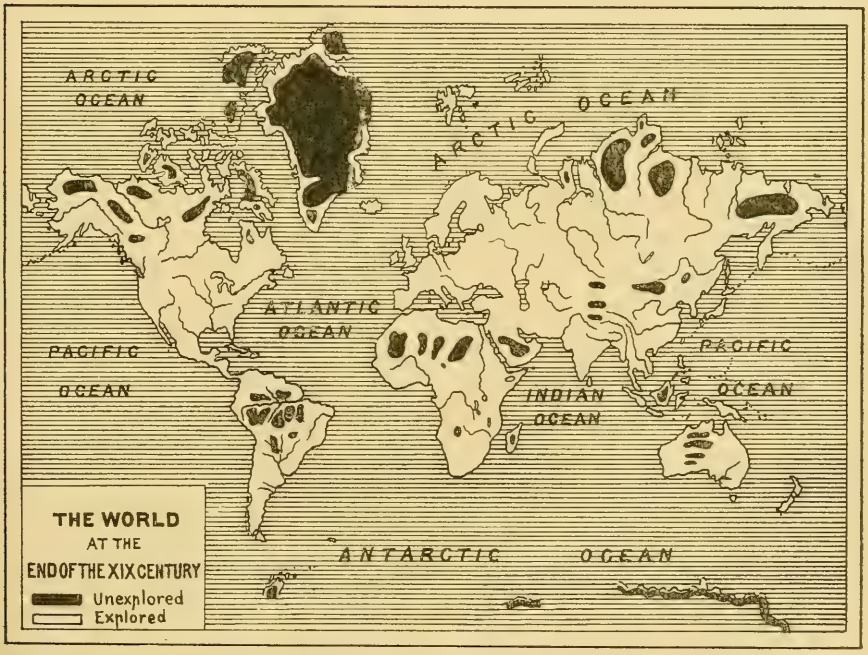
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VIRGIN FIELDS REMAINING

Even in Africa, which for a quarter of a century has engrossed the zeal and energy of explorers, there is much yet to be made known and charted. Not only is there great work to be done in the Libyan Desert and the Central Sahara, but even the country of the Taurigs, in Western Sahara, needs thorough exploration. South of Abyssinia and northwest of Lake Rudolf is almost virgin ground. The most interesting areas are the primeval forests in the basins of the Ubangi and Aruwimi. These regions invite naturalists and ethnologists to reveal to the world their fauna, flora, and ethnology, and especially to correlate information on the pygmies of Du Chaillu, Stanley, and Schweinfürth.

The new year presents such political complications as insure tremendous changes in eastern Asia during the twentieth century. As rehabilitated China concedes extended spheres of foreign influence, geographical knowledge will grow apace. Gradually the great blanks in Manchuria, Mongolia, Tibet, and Indo-China will be filled on maps of Asia. Like advances may be expected as to Arabia, Sumatra, Borneo, the Malay Peninsula, and especially the Philippine Archipelago. In the last-named region the almost untraversed islands of Mindanao, Mindora, and Palawan will soon yield to the energetic and intelligent explorer the long-hidden secrets of nature as to their fauna, flora, and capabilities of service to mankind in general and to the United States in particular.*

MEXICO OF TODAY

BY SENOR DR. DON JUAN N. NAVARRO, CONSUL-GENERAL OF MEXICO IN NEW YORK CITY

MY object in preparing this paper is to present to the members of the National Geographic Society and to the readers of its journal some well-ascertained facts about the Mexico of today and the many natural and commercial attractions which make it one of the best places in which to invest capital with security and the promise of a speedy and splendid return. Before entering upon my subject I wish to state that my words and opinions are made on my own responsibility, and are in no sense semi-official. In speaking of my own country I can hardly be required to be impartial in my opinions, but in the statement of facts I shall endeavor to give not only my own private

* Other papers on the advance in geographical knowledge during the past one hundred years are:

"The Progress of Geography during the Nineteenth Century." By Gilbert H. Grosvenor. Appendix to the Report of the Secretary of the Smithsonian Institution for 1900.

"The Transformation of the Map (1825–1900)," By Joseph Sohn. Scribner's Magazine, March, 1901.

"A Century of Exploration." By Cyrus C. Adams. The World's Work, January, 1901.

"The Geographical Conquests of the Nineteenth Century." By Angelo Heilprin. The N. Y. Evening Post, January 12, 1901.

"Fields for Future Explorers." By Sir Henry M. Stanley. Windsor Magazine, January, 1901.

"Welche Erdgebiete sind am Schlusse des 19 Jahrhunderts noch unbekannt?" Von H. Singer, *Globus*, 2 Juni, 1900.

judgment, but the opinions of persons and newspapers who have nothing to expect or fear from Mexico.

Some years ago I knew by sight a tourist who went to Mexico City and staid there exactly a week, not knowing, of course, a single word of Spanish, and on his return home published an article on Mexico, relating all his romantic adventures in the country, among which was an attack by a band of robbers on a stage coach where that remarkable man was traveling. The captain of this band was none other than a black-eyed Señorita, who practiced the dangerous and romantic vocation of highway robbery. All those adventures were very entertaining, and their only fault was not to have any existence except in the fertile imagination of their inventor.

Within the past thirty years the means of transportation have wonderfully increased. Instead of sailing vessels and a steamer every three weeks, there are now two regular steamers every week and many "tramp" steamers, and by land we have four railroad lines connecting the two countries.

The configuration of the land of Mexico is very peculiar; low near the coasts, it ascends continually and very rapidly to the interior, until an altitude from 6,000 to 10,000 feet is reached above the sea-level, arriving at what is called the "table land."

Our capital, Mexico City, has an elevation of nearly 7,400 feet—that is to say, it is from 800 to 900 feet higher than the highest peak of Mt. Washington, which has an elevation of 6,500 feet. Although the city is only a little more than 19 degrees north of the Equator, it never experiences a tropical summer. That a light overcoat is needed in the evening at every season of the year is seldom appreciated by foreign travelers, who, under the notion of visiting a tropical country, come provided only with summer clothing, and thus often contract diseases consequent upon exposure to the cold air.

Not a single navigable river traverses the whole country. This unfavorable natural condition has necessitated the building of many railroads at an enormous cost over the mountainous soil.

Our constitution is similar to that of the United States in the main points. Mexico is a federal republic, divided into States and Territories; the former ruled by their particular constitutions, and the latter directly governed by the federal authorities. The executive is appointed by popular election every four years, but as the constitution prescribes no limits for reëlection, we all have had the pleasure, and, in our opinion, the good sense, of reëlecting General Diaz for the fifth term, ending on November 30, 1904.

Perhaps some persons will not deem it in accordance with republican ideas to reëlect a man so many times, but we Mexican citizens answer that if it is not in accordance with certain theoretical principles, it is in perfect conformity with that sense called *common* precisely because it is so *rare*.

The president of a republic is the attorney, elected by the citizens to administer for a certain period, under prescribed rules established by the constitution, their foreign and interior affairs. If we find a person who performs the duties imposed upon him with remarkable ability and honesty, as we Mexican citizens believe that a man of that kind cannot be very easily found, we renew our power of attorney for another four years, leaving intact the most severe maxims of republicanism.

This custom of changing as little as possible those public officers who for the performance of their duties require a certain amount of technical instruction and experience is very old in Mexico. Even in the times when political parties waged terrible war upon each other, causing frequent changes of administration,

many officers who for their competency and honesty seemed to all to be the right men in the right places were left undisturbed.

If we entertain an elevated opinion of General Diaz we only agree with what the press of every country, from Russia to Spain and from Cape Horn to Washington, declare when they assert that Mexico is one of the most prosperous and best governed countries in the world.

Our constitutional laws differ from those of the United States in denying the right to religious corporations of any denomination to possess or administer or to hold any mortgage upon real estate. In consequence the property of such corporation must be in cash or in shares of railroad, telegraph, manufacturing, mining, or some other kind of enterprise which keeps their money in constant circulation. The object of this legislation was to prevent the stagnation of real estate constantly produced by those corporations having two characteristics—indefinite duration and possession in common—not any of their members being able to dispose of any part of the property, as is the case in mercantile associations.

Another point worthy of mention is the disposition of our fundamental laws relative to marriage. Our legislators considered marriage as the corner-stone of the social edifice, and consequently they did not leave it to the legislatures of the States, but prescribed precise and ineludible rules as to its nature and form of contract.

In short, they considered marriage a civil contract constituted by the indissoluble union of a single man to a single woman, and requiring for its legal validity that it be contracted before a civil magistrate appointed for the purpose. Of course, the laws do not prevent the contracting parties from having recourse to the ministers of their religious creed, and this is the reason why in Mexico all nuptial ceremonies are double—one of a religious and the other of a civil character.

Some lawyers say "that it is not convenient to hinder or make marriage a little difficult;" but others answer in reply, "that it is better to oblige men and women to practice the known proverb, 'Look before you leap,' or, as we say in Spanish, '*Antes que te cases, mira lo que haces*' (Before you get married, think of what you are doing)." Divorce is absolutely rejected, though legal separation is allowed, with the formalities prescribed by said laws.

The public administration of Mexico is divided into seven departments: Foreign Affairs; the Interior; Justice and Public Education; Improvements, Industry, Commerce and Colonization; Communications and Public Works; Finance and Public Credit; and War and Navy.

The Department of Foreign Affairs maintains amicable relations with all the countries of both hemispheres. Today Mexico has not a single cause of disagreement with any power or people in the world.

One of the principal objects of the Department of the Interior is to cultivate cordial relations between the Federal and State authorities. There was a time when almost every State governor conscientiously believed it to be his duty to oppose in every way the Federal Executive, and even some of them maintained a large military force, not to keep peace and give public security, but in order to resist by force, if necessary, the orders of the Federal Executive. Those narrow-minded and anarchical ideas are things of the past, and General Diaz, in his last report, relates with patriotic pleasure "that not a single State has any difficulty or displeasure with the Federal authorities or with any of its neighboring States, and that all their governors try to act in perfect accord with the Federal Executive to give an impulse to the continual progress of the

whole country." In other words, they are sufficiently enlightened to avail themselves of the reasonable liberty given by the constitution to administer their internal affairs, and remember that they are only members of that great body called the Mexican Republic, the only sovereign in the true and correct sense of the word.

The board of health is a branch of this department, and the Federal Executive and all the States devote to it special attention. In the City of Mexico a general hospital will be completed very soon, where 22 isolated pavilions have already been finished and where more than 600 patients can be commodiously, hygienically, and scientifically cared for.

The States have followed this example, and many of them have finished or have in actual construction similar institutions based upon the same scientific principles.

The efficacy of the measures taken by the board of health in regard to vaccination and the prevention of smallpox has received the amplest confirmation from experience. In 1898 an epidemic of smallpox broke out in different parts of the country and in the City of Mexico. The total number of deaths was only 78, the great majority being foreigners, who had not taken the precaution of being revaccinated.

We have another institution in excellent condition in the Federal district; that is the police. The whole force is divided in two large sections—the city or urban and the country or rural police.

The greater part of the first consist of footmen, with a small squadron of mounted police, while the second or rural police is exclusively composed of mounted men.

The distribution of the city police is, in the opinion of many natives and foreigners, perfectly organized for public protection. There is always a policeman stationed at the crossing of every street and avenue, and misdemeanors and crimes can often be prevented and the criminals almost always caught. In general, the policemen are courteous and ready, not only to help when called, but to give any information about streets and public buildings—in a word, to be useful to everybody. The services rendered are entirely gratuitous, and many persons, especially foreigners, who with the best intention have tried to give them a voluntary reward for the recovery of lost goods, can testify that the reward has never been accepted in any form. General Diaz in his last report makes the important observation that well-made statistical tables prove that it is not criminality that has increased, but rather the efficiency of the police.

The rural police, who guard the roads of the country in general, are formed exclusively by mounted men picked from the best riders of the Republic and are mounted on splendid horses. This force, by reason of their efficiency and beautiful appearance, always attract the attention of the spectators.

Places for the correction and punishment of criminals, or penitentiaries, are being built throughout the Republic according to the systems proven best by experience, and are all founded upon the philosophical and truly Christian idea that society, when it takes hold of a criminal, does not intend to wreak vengeance on him, but to prevent him from repeating his offensive acts and to reform and convert him by every possible means into a good and honest citizen, and, at the same time, to deter others from following his example.

Let us now glance briefly over two of the most important foundations of any society, and, more especially, of a Republic—the department of justice and public education.

The Federal and State authorities are continually trying to perfect the administration of justice and to elect able and honest citizens to the judgeships. Our

constitution, like yours, decrees that the judicial authorities must be elected by popular vote, and these elections are held in the most tranquil way. My own personal opinion is against this manner of appointing judges and magistrates, as I do not think popularity is always the best qualification for the sacred duties of a judge.

The importance of public education is fully appreciated by the Federal and State authorities, and there is a complete system derived from the study by competent persons of the methods followed in foreign countries. The Federal government has not only adopted the systems considered the best, but has appointed boards of education to give to public education an impetus in the right direction and to make it uniform in the Republic.

In 1898 the number of schools in the Republic was 12,358, and of this number 6,738 were supported by Federal and State authorities, 2,953 by municipalities, and 2,667 by private parties. The average monthly attendance of pupils was 556,009. The expense of the established schools supported by the authorities amounted to $5,980,180.72, not including the schools kept by private parties, of which I have no information. If we take as a point of comparison the cost of the schools paid by the authorities, we can calculate very approximately that $7,000,000 were expended for public education in Mexico in that year. The number of schools for girls was 3,296; for boys, 6,813, and mixed, 2,249. This total has certainly increased since then.

The attendance of pupils increases very rapidly year after year, and I was agreeably surprised, when visiting my country after an absence of many years, to observe the wonderful results attained by our educational system. There is yet much to be done, but what has been already accomplished is truly surprising, and the board of education is continually improving and multiplying the means of instruction.

To make good teachers and to impress unity of method there are normal schools for men and women. In the normal school for women in the City of Mexico there are actually more than 1,600 girls who want to adopt the noble profession of teachers. Another excellent normal school exists in the State of Vera Cruz, and there are others in other States, but I have no data at hand concerning them.

For professional instruction there are, principally in the Federal districts, schools of jurisprudence, engineering in all its branches, commerce, agriculture, arts and trades, fine arts, one conservatory of music, and for all avocations required by the actual state of sciences and arts, and the government is continually giving to each one of them all means conducive to perfect instruction, beginning with a comfortable and hygienic building. The one, for instance, in use by the school of arts and trades for women has been extended because the actual attendance is more than 1,000.

The number of public libraries in 1898 was 130. The national library of the capital last year added to its catalogue nearly 10,000 volumes by purchase and 9,500 volumes by the donation of Mrs. Ysabel Pesado de Mier, widow of our late and lamented minister to the French Republic, Mr. Antonio de Mier y Celis, my dear friend, and one of the best and most patriotic citizens Mexico has ever produced.

The number of museums in the Republic is about 30. The National Museum of the capital, the richest of all, received last year valuable additions in the acquisition of a collection of archæological pieces from the State of Michoacan, a collection of antique objects from the Isthmus of Tehuantepec, and fac-similes of the codices existing in the European libraries relative to our history, donated

by the Bishop of Tehuantepec and the Duc de Loubat.

The newspapers published during that year numbered 533, and of that total 153 were published in the City of Mexico, among them being daily, weekly, monthly, and quarterly journals. Very few, fortunately, were exclusively given to politics, the rest to the exposition and discussion of science, industry, commerce, agriculture, jurisprudence, medicine, political economy, mining and civil engineering, military art, etc.

These few facts, rapidly enumerated, will give some idea of the real state of the public education in Mexico.

Passing to our Department of Improvements, Commerce, and Industry, etc., our mining industry is the most important in every respect and deserves to be mentioned first. The number of mineral properties at the end of last year was 12,304, covering an area of 128,380 hectares, the equivalent of nearly 320,000 acres, besides six extensive zones in the States of Sonora, Chihuahua, and Michoacan and in the territory of Lower California, which were rented to parties under contracts made by the Executive and approved by the Federal Congress for the working of all mines that may be discovered in these tracts of land.

The yield of our silver mines in the four years from 1892 to 1896 was $225,247,459, or a yearly average of $56,311,864. During the four years 1896–1900 the production was $274,370,157, a yearly average of $68,592,540. Our production of gold is also increasing. From 1892–1896 it was $14,123,876, and from 1896–1900, $31,108,425—that is, the output more than doubled during the last four years.

In the production of silver from 1899 to 1900 there was a decline of more than two millions of dollars, but General Diaz explains the cause very satisfactorily by recalling the instability of production, which is subject to many accidents and unforeseen circumstances that diminish or stop suddenly the output of a silver mine. Our mining enterprises are not now confined to silver and gold, but in the mining of many other metals, such as copper, antimony, lead, and mercury, large capital is employed.

Our exports of copper in the last financial year amounted to nearly ten millions of dollars. Some of our mineral-melting establishments have disposed of the following quantities :

Campañía Metalurgica Mexicana de San Luis Potosí, from December, 1896, to September 30, 1900, 332,358 tons.

Gran Fundición Central de Aguascalientes, from December, 1896, to October, 1900, 625,855 tons.

Compañía del "Boleo" baja California, in the years from 1896 to the end of 1899, 40,422 tons.

A department of vital importance to us is that of colonization. Formerly the government made some efforts in this direction, and we now have 29 colonies in steady progress, 13 established directly by the government and 16 by private companies. Experience has taught us, however, that it is better to leave this matter to private enterprises, and the only positive aid given by the government is the tranquillity, security, and incessant and rapid progress of the whole Republic. When these advantageous conditions become universally known the current of immigration will flow into Mexico, where nobody can starve, where the poorest, with some exertion, can arrive at a comfortable situation—the middle class become rich and the rich can increase their capital by millions ; and all this with a beautiful climate, salubrious everywhere, except on the coasts, and among a peaceful, industrious people, who have well earned the reputation of being one of the most courteous and hospitable upon the face of the earth.

(*To be continued in the May number*)

GEOGRAPHIC NOTES

OFFICIAL INFORMATION RELATING TO THE PHILIPPINES

THE State Department has recently published three handsome volumes on the Philippine Islands. The first two volumes are a history of Spanish work in the archipelago, with a cyclopedic statement of the resources of the islands. The different peoples, their means of livelihood, their customs, and character are sympathetically portrayed by the editors, Rev. José Algué and the Jesuit Fathers of Manila. The third volume is an atlas of about 60 colored maps. This atlas is the most comprehensive statement of what is known of the geography of the islands ever published. The collection of the material has been the work of generations of the Jesuits, but under the Spanish régime want of money had prevented the publication of the mass of facts obtained. The map-makers of the U. S. Coast and Geodetic Survey have systematized the material which the Jesuits supplied. Volumes I and II are in Spanish and illustrated with very good pictures. The set of three volumes may be obtained from the State Department by the payment of $20.

The Reports of the Taft Philippine Commission, which form a volume of 600 pages, may now be obtained from the State Department gratis.

The War Department has recently issued a large map of Luzon on the scale of 10 miles to the inch. It embodies all the latest information received by the department from its officers and agents in the islands. The department has also printed a third and revised edition of the large map of the archipelago based on the map of Montero Y. Gay, first published in Madrid.

The latest edition of the "Progress Map of Signal Corps Telegraph Lines and Cables" in the Philippines shows all lines laid by the corps up to February 1, 1901. The lower half of Luzon is now covered with a network of wire, while two trunk lines penetrate to the extreme north end of the island. The islands of Panay, Cebu, Negros, Leyte, and Bohol each have several hundreds of miles of wire, constructed by the corps, and are connected by military cables. There are now in operation in the islands 9,000 miles of wire and 400 miles of cable.

These maps may be obtained by responsible persons gratis.

THE CENSUS OF INDIA

THE census of India, taken March 1, 1901, gives the population of that vast country as 294,266,000, an actual increase of only 1.49 per cent during ten years, while during the preceding decade the increase was 11.2 per cent.

The population in 1891 was 287,717,000, but as certain tracts are included in the census of 1901 that were not enumerated in 1891, the net increase is only 4,283,069. In numbers India has thus added to her population less than one-third of what the United States have gained, though the former has four times the population of the latter—an increase of four millions as against thirteen millions for the United States.

The reasons of this small increase in the figures are two: first, the terrible ravages of the plague for four consecutive years in the Bombay Presidency and the two great famines of 1896–'97 and 1899–1900, and, second, the greater accuracy with which the work of the census has been performed.

The population of British India has increased considerably, while in the Native States it has fallen off. British

India now numbers 231,085,000 against 221,266,000 in 1891, and the Native States, 63,181,000 against 66,050,000 in 1891. It is yet too early to analyze the returns for the Native States, but there would appear to be an excessive decline in the birth rate.

The following table gives the population in thousands, the third column showing the percentage of increase or decrease:

British Territory.	1901.	1891.	Percentage.
Ajmere, Marwar	476	542	— 12.17
Assam	6,122	5,433	+ 12.67
Bengal	74,713	71,346	+ 4.72
Berar	1,491	2,897	— 4.99
Bombay	15,330	15,957	— 3.93
Sind	3,212	2,871	+ 11.88
Aden	41	44	— 6.48
Upper Burma	3,749	3,362	+ 14.49
Lower Burma	5,371	4,408	+ 21.84
Central provinces	9,845	10,784	— 8.71
Coorg	170	173	+ 4.28
Madras	38,208	35,630	+ 7.24
Northwest provinces	34,812	34,253	+ 1.63
Oudh	12,884	12,650	+ 2.40
Punjab	22,449	20,766	+ 7.58
Baluchistan	810	*	*
Andamans	24	15	+ 56.95
Total	231,085	221,266	+ 4 44
Native States.			
Haidarabad	11,174	11,537	— 3.14
Baroda	1,956	2,415	— 19.23
Mysore	5,538	4,943	+ 12:
Kashmir	2,906	2,543	+ 14.24
Rajputana	9,841	12,016	— 18.1
Central India	8,501	10,318	— 17.5
Bombay	6,891	8,059	— 14.49
Madras	4,190	3,700	+ 13.23
Central provinces	1,983	2,160	— 8.19
Bengal	3,735	3,296	+ 13.33
Northwest provinces	799	792	+ .91
Punjab	4,438	4,263	+ 4.12
Burma	1,228	*	*
Total Native States	63,181	66,050	— 4.34
Total all India	294,266	287,317	+ 2.42

* No comparison possible.

GEN. FOSTER ON MEXICO

HON. JOHN W. FOSTER has been contributing to the *New York Tribune* a series of very pointed papers on the condition of Mexico of today. General Foster began his distinguished diplomatic career in 1873 as the United States Minister to Mexico, where he represented his nation for seven years. Until this winter he had not revisited the country in the twenty years since his recall. In the meantime he has been the United States minister to the courts of Russia and Spain, and held the highest diplomatic office in the United States, that of Secretary of State.

Instead of geographic isolation, Mexico is now bound to the United States by the iron ties of four railroads, while many steamship lines ply between Vera Cruz and foreign ports. Security of life and property is now assured. The evidences of progress and prosperity are seen on every hand. Mexico, the capital city, has doubled in numbers, and in its conveniences and wealth-bringing attractions may vie with the great cities of the continent.

In its foreign relations Mexico has risen to a position of dignity and gained the respect of all nations. "A marked feature of the recent diplomatic relations of Mexico has been the extension of these relations to the Far East. Several years ago a treaty of amity and commerce was effected with Japan, and missions are now maintained at the two capitals of both governments. Last year a similar treaty of a very liberal character was signed at Washington by the Mexican Ambassador and the Chinese Minister. By it Chinese laborers are admitted into the country, and they are already coming, especially to the Pacific Coast, in considerable numbers, and by their industrious and persistent habits are making themselves felt as an important element of the country."

To the able management of affairs by

President Diaz Mr. Foster attributed the prosperity of the country. The result of the President's good judgment is especially evident in the present confidence in the financial condition of the country, both official and private. "The revenues which before (the election of General Diaz) had been barely $20,000,000 annually, soon doubled, then trebled, and within ten years had increased more than sixfold, reaching as high as $120,000,000."

This increase made possible the abandonment of the old system of taxation of goods passing from state to state and of taxes collected at the city gates on all articles of consumption entering the city. By this reduction in the branches of taxation the national revenues have diminished to $60,000,000, which is sufficient for all the current needs of the government, and yields a surplus to be expended for special purposes.

The entire indebtedness of the Republic amounts to about $177,178,000, borne by about 13,570,000 souls. Mexico's debt *per capita* is thus only $13, while that of Canada is $71.

EXPLORATION DURING VICTORIA'S REIGN

A PERUSAL of Gen. A. W. Greely's able article shows that nearly all the enormous advances in geographic knowledge during the past 100 years were made during Queen Victoria's reign. In 1837 Livingstone was attending medical and Greek classes in Glasgow, and Stanley had not been born. Victoria had reigned 16 years before McClure, in 1853, attained the Northwest Passage, and 43 years before Nordenskjold, in 1880, solved the problem of the Northeast Passage. Sir James Ross, Wilkes, Weddell, and D'Urville all won their Antarctic laurels within her reign. Australia was not crossed from north to south by Stuart till 1862, 25 years after her accession, and from east to west by Colonel Warburton till 1873, 36 years after her accession. Huc, the explorer of Tibet; Pumpelly and Richthofen, pioneers in China, and Nevelskoy, who ascended the Amur from the sea, gained their fame within Victoria's reign. Frémont, Powell, Dall—names illustrious in the exploration of the American continent—also did their work since 1837.

From her accession Victoria was Patron of the Royal Geographical Society, and to her encouragement are due many of the great enterprises planned and successfully carried out by the Society. She was ready also to reward the work of British explorers. James Ross, Leopold McClintock, John Franklin, Samuel Baker, Robert Schomburgk, Henry M. Stanley, and others, she knighted in recognition of their achievements. The Founder's Medal and the Patron's Medal, awarded annually by the Royal Geographical Society, were granted by her.

PHENOMENAL INCREASE IN POPULATION OF ITALY

THE population of Italy has practically doubled in the last twenty-years, a rate of increase that surpasses that of all nations of Europe and even the United States. This, too, notwithstanding the burdens of excessive taxation, that would tend to diminish the birth rate. The last census was taken twenty years ago, in 1881, and showed a population of 21,000,000. According to the census taken early this year the population now numbers 35,000,000. It is safe to estimate the number of emigrants during the twenty years as at least 5,000,000, so that the increase by birth has been about 20,000,000. It has taken the United States thirty years, aided by 12,000,000 immigrants, to double its numbers.

U. S. COAST AND GEODETIC SURVEY

FIFTEEN young Filipinos will soon be selected by civil service examinations in Manila as aids in the U. S. Coast and Geodetic Survey. They will probably be brought to the United States for a preliminary training at the head office in Washington before being assigned to active work in charting the rivers and harbors of the islands. They will be paid $720 a year, a very generous salary in the Philippines, and clever young Filipinos will undoubtedly be secured. The experiment, initiated by Dr. O. H. Tittmann, superintendent of the Survey, is of great importance, as it is the first step to interest, train, and identify the young Filipino in the scientific development of his country.

The coast of southeastern Alaska has been well charted by parties of the Survey during the past several years, but the approaches to this section have remained unmapped. This summer the *Pathfinder* and *McArthur*, in charge respectively of J. J. Gilbert and F. Westdale, will carry survey parties to these channels and soundings will be taken to accurately determine them. A large party will work in Prince William Sound, while several vessels will carry other men westward to tackle the difficult problem of charting the many channels between the Fox Islands of the Aleutian archipelago.

GLACIAL ACTION IN AUSTRALIA

THE evidences of glacial action in Australia during Permo-Carboniferous times are discussed by Professor Penck in the *Zeitschrift* of the Berlin Gessellschaft für Erdkunde, and compared with traces of simultaneous action in India and South Africa. The hypothesis of a shifting of the South Pole to a central point on the tropic of Capricorn, in longitude 86° E., does not satisfactorily account for the geological facts and the existence of glacial conditions over such an enormous area. Professor Penck is quoted in *Nature* as saying that the appearances ascribed to ice action present in each case certain features not characteristic of ordinary glacial deposits; the deposits are stratified and the pebbles are faceted in the manner first described by Wynne. He further observes that the Gondwana beds, always closely associated with these boulder deposits, have lately been found in the Argentine Republic, and he compares the bedding and faceting with conditions induced by pressure observed in the Nagelfluh and in certain localities near Vienna. While many of the observed facts appear to indicate glacial action, still he thinks that these special points demand investigation.

THE NORTHWEST BOUNDARY

IT is well known that the boundary between the British possessions in North America and the United States, from the Lake of the Woods westward to the Pacific Ocean, was long a matter of dispute. Every one knows, too, that after the controversy had given rise to threats of war the 49th parallel was agreed upon by both governments as the dividing line. So, as represented upon the map, the whole question seems settled. Nevertheless there are many persons along this line to whom nothing indicates whether they are living in the territory of the King or of the Union. During 1872–'76 a joint commission erected 388 boundary monuments along the line about two miles apart, but they hardly proceeded farther west than the Rocky Mountains, and left the 410 miles between the mountains and the Strait of Georgia almost unmarked. To survey

and mark out this far northwest boundary an expedition is now being organized by the Geological Survey, at the direction of the State Department. It is probable that the Canadian authorities will coöperate with the Americans in definitely indicating the exact boundary. Much of this region is still without roads and trails. The work will be difficult, as it must be prosecuted in part through the wildest region of the Rockies and Cascades, where impassable streams and lofty cliffs make direct advance impossible. The necessary surveys will require three or four years.

After the work is completed it must be approved by a treaty between the British and American governments, describing in detail the location of this part of the northwest boundary and the monuments by which it is indicated.

Mr. E. C. Barnard, the well-known topographer of the U. S. Geological Survey, will run the line, in coöperation with Mr. C. H. Sinclair, of the Coast and Geodetic Survey. Messrs. Bailey Willis, F. L. Ransom, and G. O. Smith accompany the party as geologists to study the geology of the country in the vicinity of the dividing line.

SUSPENSION RAILROAD IN GERMANY

A SUSPENSION railroad of novel construction has recently been opened at Elberfeld, in Germany. It is about eight miles in length and runs through the towns of Barmen and Elberfeld, following the course of the river Wupper. The up-and-down lines have only a single rail apiece, supported by an iron framework of a kind hitherto unknown in railroad engineering. Each car hangs from two supports 25 feet apart, fitted with double wheels, which run upon the overhead rail. These supports are so shaped that it is believed to be impossible for them to leave the line, even though an axle or a wheel should break.

The motive power is electricity, supplied by a wire attached to the rail. Each pair of wheels is operated by an electric motor controlled by a motorman in the front car. The railroad is the invention of the late Herr Eugene Langer, of Cologne, who died in 1895. The chief advantage claimed is cheapness of construction, for the line can be built over public roads and rivers, where no ground need be purchased.

CAPE TO CAIRO TELEGRAPH

WORK is progressing on the telegraph line from Cairo to the Cape, although little has been heard about it of late, owing to the war in South Africa and the great distance from civilization the engineers have penetrated. The line of poles and wire now stretches 3,000 miles up from the Cape to a point 50 miles north of the town of Kasanga, on the shore of Tanganyika, in German East Africa. Only 1,200 miles remain between Kasanga and the southern end of the Egyptian telegraph line. This last link will be traversed more easily, as the apparatus and supplies can be brought by water instead of by native porters. Porters have to be continually engaged, as the men refuse to go more than a few hundred miles from their homes. Horses, mules, and cattle cannot be employed, as they cannot survive the bite of the tsetse fly.

The country just traversed between Lake Tanganyika and Salisbury is the hardest bit of ground to be met with, for it is mountainous, heavily wooded, and malarious. Mr. E. S. Grogan, the explorer, reports having seen engineers supervising the work from litters while racked with fever and the thermometer standing at 104°.

The rinderpest and the war with the

Matabeles which followed also delayed the work. The Matabeles misunderstood the white man's motive in killing their apparently well cattle, but which were really infected with the disease, and in revenge tore down miles of telegraph poles and melted his wire into bullets, which they fired back at him. In this war $200,000 worth of the company's supplies were destroyed.

They have had less trouble than was expected from wild animals; sometimes, to be sure, elephants have knocked down the poles, and once a lion helped himself to several natives before he was killed.

GERMAN SUBMARINE CABLE SYSTEM

A VAST system of submarine cables is being projected by Germany. In October, 1900, a line was opened connecting Kiaochau with Chifu, and the southern end is now being rapidly extended to Shanghai and Canton. Later a branch cable will be laid from Kiaochau to Nagasaki to connect with the American Pacific cable, which is destined to be soon constructed, while the main cable will be continued to Manila, Sumatra, Borneo, New Guinea, and the Caroline Islands. From the Azores a line will be laid southward to the Cape Verde Islands, thence down the Atlantic to the South American continent to Bahia, Rio de Janeiro, and Montevideo.

On the other side of the Atlantic a German cable will unite Morocco, Guinea, the Kameruns, and German Southwest Africa. When the construction of the system has been completed, the German Emperor will be able to communicate with his possessions in every quarter of the world independent of English lines. His messages will cross the Pacific and American continent on American cables and the Atlantic on the German New York-Azores-Emden line, completed last year.

GREAT BRITAIN IN THE YANGTZE VALLEY

NOTHING is more noticeable than the decay of British influence in southern China during the last five years. It is not merely that British influence has declined, but that the influence of other powers has largely developed in a region supposed to be distinctively the British sphere. Says the Shanghai correspondent of the *Times* in a recent letter: "The Yangtze is steadily growing less and less English and more and more international." He fortifies this statement by discouraging facts observed in Shanghai and Hankau, "the key of the Upper Yangtze." He says: "The one advantage we still possess over the other powers in the Yangtze Valley is the confidence and good will of the better classes among the peoples and officials of central China." But he concludes: "British influence in the Yangtze Valley, as in the rest of China, is, relatively to that of other nations, not an increasing but a steadily and rapidly diminishing quantity."

Sir Archibald Geikie, who retired in March from the head of the British Geological Survey, was born in Edinburgh sixty-six years ago. His whole life has been spent in geologic work. When barely thirty he was appointed Director of the Scottish Geological Survey, and later held the chair of geology in Edinburgh University. In 1881 he was chosen Director General of the Geological Survey of the United Kingdom, and ten years later was knighted in appreciation of his work. James Geikie, whose name is perhaps better known in America, is the younger brother of Sir Archibald. J. J. Harris Teall, the well-known writer on geological subjects, has succeeded Sir Archibald Geikie as Director General of the British Geological Survey.

An Austro-Hungarian floating exposition leaves Trieste in May for a fifteen months' voyage around the world. It is deemed impracticable for more than one ship to take part in the enterprise, as the trip is an experiment. New York, San Francisco, Yokohama, Shanghai, Singapore, Batavia, Calcutta, Madras, Aden, and Suez will be visited. Firms that send exhibits are charged $1,000 for each person and $200 for every cubic meter of space or per ton weight.

U. S. Weather Bureau.—After July of this year the number of forecast districts of the U. S. Weather Bureau will be increased by the addition of Boston, Galveston, and Denver as centers of new districts. The United States is now divided into four districts, each with a center, at which the forecast for that particular district is made. These centers are San Francisco, Portland, Oregon, Chicago, and Washington. By the division into smaller districts greater efficiency will be attained.

An Earthquake Occurred in Spain on February 10, which did considerable damage in Grazalema, a town of 10,000 inhabitants situated in a hilly district of the province of Cadiz, about 70 kilometers, nearly due north, from Gibraltar. Several large buildings, factories, and mills, as well as the church of St. Joseph, were severely injured. Señor Augusto Arcimis, writing to *Nature* from the Central Meteorological Institute of Madrid, says that the body of water that provided motive power for the machinery in one of the factories has disappeared.

British Yukon Telegraph.—It has been stated with apparent certainty that the two British parties constructing the telegraph line from Quesnelle to Atlin, who are working toward each other, the first from Quesnelle northward and the second from Atlin southward, at the halfway point, instead of meeting, found themselves on opposite sides of an impassable mountain range, sixty miles across. Atlin connects with the United States lines uniting Cape Nome, Dawson, and the military posts of Alaska, while from Quesnelle wires run to the great continental systems.

In Jamaica an African Language is still spoken among the Maroons, the descendants of wild negroes who escaped from slavery during the early days of the slave trade. According to Maj. J. W. Powell, of the Bureau of American Ethnology, this language belongs to the Kongo region. The Maroons of Jamaica seem to be in a barbarous or semi-civilized condition, resembling in this respect our North American Indians, and, like the Amerinds, they are confined to reservations, where they still preserve many of the customs and traditions of their savage ancestors.

The Recent Census of Vienna shows that in Austria, as in Germany, there is taking place a very rapid increase in city populations, due in large part to immigration from the rural districts. Vienna has now 1,635,647 inhabitants, and has increased in population during the past ten years 21.9 per cent. Vienna now ranks fourth among the European capitals, London, Paris, and Berlin exceeding her. London and Berlin are increasing at a faster rate. Of American cities, New York and Chicago outrank Vienna in numbers, and each is increasing more rapidly—New York 37.8 per cent, and Chicago 54.4 per cent, in ten years.

The U. S. Board on Geographic Names held no meeting during March. By act of Congress a second edition is being printed of the volume containing all the decisions of the Board up to January 1, 1900. Copies of the report may be obtained by applying to Marcus Baker, secretary of the Board, U. S. Geological Survey, Washington, D. C.

GEOGRAPHIC LITERATURE

Newest England. By Henry Demarest Lloyd. Illustrated. 8vo., pp. 387. New York: Doubleday and Page.

Mr. Lloyd ably traces the development of those forces in New Zealand which have given pensions to the old and have made government monopolies of life and accident insurance, and also of railways and telegraphs. He describes the government and people as "the least bad this side of Mars"—*i. e.*, they are not perfect, but no others are as good. The relatively enormous public debt, $300 for each man, woman, or child, a *per capita* debt which in this country would amount to twenty-two billion dollars, and the consequently decreasing birth rate are two grave facts which Mr. Lloyd overlooks.

An Old Indian Village. By Johan August Udden. Augustana Library Publications, No. 2. Rock Island, Illinois, 1900.

Although the author of this interesting brochure lays no claim to special skill in archæology, his work may well serve as a model to local archæologists throughout the great area covered by the Mississippi drainage system.

The scene of the explorations conducted by Professor Udden at intervals during seven years from 1881 is Paint Creek valley, a mile and a half south of Smoky Hill River, in McPherson County, Kansas. The village remains consisted of fifteen low circular mounds from twenty to twenty-five feet in diameter, without particular order of arrangement and covering an area of about twenty acres. The average height of the mounds is about two feet, while some rise only very slightly above the surface of the prairie.

Excavation revealed axes, hammers, polishers, metates, manos, flakers, pipes, knives, and scrapers of stone, and awls, hoes, beads, gouges, and other objects of bone. Bones of numerous animals, fishes, and the wild turkey, as well as the valves of fresh-water clams, were also found during the excavations, indicating that the former occupants of the site gained a livelihood by hunting as well as by agriculture.

Perhaps the most interesting object unearthed from the Paint Creek village—certainly the most interesting from the historical and geographic points of view—is the piece of chain mail illustrated in the volume, but unfortunately since lost. The definite origin of this relic of early Caucasian exploration is not known, but as the field of Professor Udden's researches was unquestionably a part of the Province of Quivira, which the famous expedition of Francisco Vasquez Coronado penetrated in 1541, and which led to similar expeditions into the same locality during the succeeding half century, the relic is in all likelihood of Spanish origin.

The Province of Quivira was inhabited in the sixteenth century by the Wichita Indians, who later occupied an extensive area southward in the present Oklahoma, whence the name of the Wichita Mountains and of Washita River. They were the only Indians of the plains who lived in grass houses (such as Coronado's chroniclers describe as having been seen in the Quivira region), the Pawnees occupying earth lodges, and other plains tribes portable tipis of buffalo hide. We may therefore assume that the Paint Creek village was inhabited by the corn-raising and buffalo-hunting Wichitas, as the relics would seem to show, and probably during the Coronado period, or at any rate during the time of one of the immediately succeeding Spanish expedi-

tions from New Mexico, as the fragment of chain mail tends to prove.

Altogether Professor Udden's work is worthy of high praise. It is regrettable that "this will be his last as well as his first paper bearing on topics of this kind." F. W. HODGE.

The Romance of the Earth. By A. W. Bickerton. Illustrated. Small 8vo, pp. 181. New York: The Macmillan Co., 1900. $0.80.

As indicated by the title, the author aims to describe the past and present of the earth in the form of a story. The idea and its execution are capital. The author naturally has not adhered strictly to the limits of known science. Where human knowledge can throw no light, he permits himself "to speculate, to make deductions from the accepted laws of nature" in order that no chapters in the romance may be missing. The book is instructive and interesting, and especially valuable to stimulate younger minds to learn more of the great "romance of the earth."

The Philippines—The War and the People. By Albert G. Robinson. Pp. 407. New York. McClure, Phillips & Co. 1901.

The volume consists of letters written by Mr Robinson to the New York *Evening Post* while he was staff correspondent for that journal in the Philippines. Mr Robinson is inclined to believe "that development in the islands would be impossible without the patient, submissive, industrious Chinaman," who is "a sort of necessary evil." The book contains much valuable information about the islands and their people, though it is doubtful if many Americans will agree with the author's pro-Filipino tendencies. Specially interesting chapters are, "The Moros of Mindanao" and "The Moros of Sulu."

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY

Popular Meetings.*

March 1, 1901.—President Graham Bell in the chair. Mr. Gilson Willetts delivered an illustrated address, "The Recent Famine in India."

March 15, 1901.—Vice-President McGee in the chair. Mr. H. L. Bridgman, Secretary of the Peary Arctic Club, and Dr. Frederic A. Cook, of the Belgian Antarctic Expedition, delivered illustrated addresses on "The Two Ends of the Earth—Peary and the North Pole, and The Cruise of the *Belgica* in the Antarctics."

March 29, 1901.—President Graham Bell in the chair. Mr. Alexander Hume Ford delivered an illustrated address, "The Railways and Waterways of the Russian Empire."

* The proceedings of the technical meetings during March will appear in the May number.

Afternoon Meetings.

March 5, 1901.—President Graham Bell in the chair. Talcott Williams, LL. D., delivered an illustrated address, "Western Asia."

March 12, 1901.—President Graham Bell in the chair. Hon. John Barrett delivered an illustrated address, "Eastern Asia—China."

March 22, 1901.—President Graham Bell in the chair. Prof. H. Morse Stephens, of Cornell University, delivered an address, "Southern Asia—India."

March 26, 1901.—President Graham Bell in the chair. Prof. Edwin A. Grosvenor, of Amherst College, delivered an illustrated address, "Northern Asia—Siberia."

April 2, 1901.—President Graham Bell in the chair. Vice-President McGee delivered an illustrated address, "Asia—The Cradle of Humanity."

Announcements.

THE ANNUAL RECEPTION OF THE SOCIETY will be held on Friday evening, April 12, in the parlors of the Arlington hotel. Mr. Paul Du Chaillu will be the guest of honor of the Society and will give some reminiscences of his travels.

A REGULAR MEETING OF THE SOCIETY will be held in the large hall of the Cosmos Club at eight o'clock Friday evening, April 19. All members resident in Washington are urged to attend, as important proposed changes in the by-laws, submitted and recommended by the Board of Managers, will be acted upon.

Object of Proposed Change in By-laws.

The Board of Managers submits and recommends to the Society important amendments to the by-laws. The proposed changes are so numerous that, for the sake of simplicity, the Board offers an entire set of revised by-laws to replace the existing by-laws. Members who wish to note in detail the modifications proposed can do so by comparing the draft which follows with the existing by-laws as printed in the MAGAZINE, Vol. IX, pages 414-416. The general tenor of the changes is set forth in the following paragraphs :

In an address read to the Board of Managers June 1, 1900, and printed in the Magazine for October (Vol. XI, pages 401-408), President Bell advocated various changes in the policy of the Society, for the purpose of making its character more truly national. The revised by-laws now offered embody one of the more radical of these changes.

At the present time the Society has *active members*, residing chiefly in the District of Columbia, and *corresponding members*, residing chiefly in other parts of the United States. The dues of active members are five dollars, of corresponding members two dollars. Both classes receive the Magazine ; active members have in addition various other privileges, including that of attending lectures. Thus constituted the Society is not national in its active membership, but only through its corresponding membership. It is now proposed (1) to merge the grades of corresponding member and active member into the single grade of *member*, (2) to fix the dues for all at two dollars, (3) to treat lecture courses, whether in Washington or elsewhere, as local privileges, to be paid for by those who are benefited.

The proposed by-laws include many minor changes which seem to the Board desirable if the general change in organization be adopted. The more important of these are (1) the enlargement of the Board of Managers by the addition of members not residing in the District ; (2) the creation of an Executive Committee for the transaction of current business ; (3) the restoration of the fiscal year to coincidence with the calendar year ; (4) the omission of section 8 of article IV, with reference to Managers who are continuously absent from meetings of the Board.

They include also a number of changes not specially related to the general change in organization. The more important of these are (1) the substitution of the single office of Secretary for the two offices of Recording Secretary and Corresponding Secretary; (2) the omission of the requirement that the Secretary and Treasurer be selected from the Board of Managers; (3) the making more stringent the rules with respect to arrearage of dues; (4) the reduction of the quorum of the Society from 25 to 20 ; (5) the provision that official notice of proposed amendments to the by-laws may be given through the Magazine.

The amendments will come up for action at the regular meeting to be held April 19.

A. J. HENRY, *Secretary.*

Proposed By-laws.

ARTICLE I.—*Name.*

The name of this Society is *The National Geographic Society.*

ARTICLE II.—*Object.*

The object of the Society is the increase and diffusion of geographic knowledge.

ARTICLE III.—*Membership.*

SECTION 1. The Society shall consist of members and honorary members.

SEC. 2. Members shall be persons interested in geographic science.

SEC. 3. Honorary members shall be persons who have attained eminence by the promotion of geographic science. They shall not be members of the corporation, nor shall they vote or hold office.

SEC. 4. The election of members and honorary members shall be entrusted to the Board of Managers.

ARTICLE IV.—*Officers.*

SECTION 1.—The administration of the Society shall be entrusted to a Board of Managers composed of twenty-four members, eight of whom shall be elected by the Society at each annual meeting, to serve for three years, or until their successors are elected. Of the eight members elected at each annual meeting, not less than four nor more than six shall

be residents of the District of Columbia. A majority of the votes cast shall be necessary for election.

SEC. 2. The Board of Managers shall elect annually from their own number a President and a Vice-President, and shall elect annually a Treasurer and a Secretary.

SEC. 3. The President shall preside at the meetings of the Society and of the Board of Managers, or may delegate this duty. The President and the Secretary shall sign all written contracts and obligations of the Society.

SEC. 4. In the absence of the President his duties shall devolve on the Vice-President.

SEC. 5. The Treasurer shall have charge of the funds of the Society, under the direction of the Board of Managers, and shall make collections and disbursements and render an annual report, and his accounts shall be audited by a committee of the Society, not members of the Board, annually and at such other times as the Board may direct.

SEC. 6. The Secretary shall record the proceedings of the Society and of the Board of Managers, conduct correspondence, and make an annual report.

SEC. 7. The Board of Managers shall fill vacancies arising in the Board.

SEC. 8. All officers shall serve until their successors are chosen.

ARTICLE V.—*Committees.*

SECTION 1. The Board of Managers shall select annually from its own number an Executive Committee.

SEC. 2. There shall be standing committees on Publications, Communications, Admissions, Research, and Finance, whose chairmen shall be members of the Board of Managers. These committees shall be appointed immediately after the annual election of the President to serve until their successors are designated.

SEC. 3. The committees of the Society and of the Board of Managers shall be appointed by the President, except when otherwise provided. The President shall be a member *ex officio* of every committee.

ARTICLE VI.—*Finances.*

SECTION 1. The fiscal year of the Society shall begin on the first day of January.

SEC. 2. The annual dues of members shall be two dollars, payable in January.

SEC. 3. Annual dues may be commuted and life membership acquired by the payment at one time of fifty dollars.

SEC. 4. Members whose dues remain unpaid on March 1 shall be notified by the Treasurer that unless the dues are paid within one month they will be in arrears and not entitled to vote at the annual meeting, to receive the publications of the Society, or to purchase lecture tickets on members' terms. Members one year in arrears shall, after formal notification, be regarded as having withdrawn from the Society.

SEC. 5. The funds of the Society may be invested and loans may be negotiated in the interests of the Society, and any other financial business germane to the purposes of the Society may be transacted by the Board of Managers.

ARTICLE VII.—*Meetings.*

SECTION 1. Regular meetings of the Society shall be held on alternate Fridays from November until May.

SEC. 2. Special meetings may be ordered by the Board of Managers or called by the President.

SEC. 3. The annual meeting shall be held in the District of Columbia on the second Friday in January.

SEC. 4. Twenty members shall constitute a quorum.

SEC. 5. Regular meetings of the Board of Managers shall be held on the same days as the regular meetings of the Society; special meetings may be held at the call of the President or on notice signed by five members of the Board: *Provided*, That for any of its own meetings the Board may substitute meetings of the Executive Committee.

SEC. 6. Lectures and lecture courses may be provided by the Board of Managers. Free admission to such lectures shall not be a prerogative of membership, but tickets shall be sold to members on more favorable terms than to non-members: *Provided*, That each life member who acquired life membership prior to the year 1901 shall be entitled to two admissions to each lecture and course.

ARTICLE VIII.—*Publications.*

The Society shall publish a journal or periodical under the title THE NATIONAL GEOGRAPHIC MAGAZINE, which shall be sent to all members of the Society not in arrears, and may be placed on sale.

ARTICLE IX.—*Amendments.*

These By-Laws may be amended by a two-thirds vote of the members present at any regular meeting, provided the proposed amendments are reported by the Board of Managers, and provided that notice thereof has been sent to all members of the Society not less than ten nor more than sixty days before the meeting. The publication of proposed amendments in THE NATIONAL GEOGRAPHIC MAGAZINE shall be deemed a notice within the meaning of this article.

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Vol. XII MAY, 1901 No. 5

CONTENTS

THE LATIN-AMERICAN CONSTITUTIONS AND REVOLUTIONS. BY JOHN W. FOSTER, EX-SECRETARY OF STATE . . . PAGE 169

MEXICO OF TODAY. BY SENOR DR. DON JUAN N. NAVARRO, CONSUL-GENERAL OF MEXICO IN NEW YORK CITY . . 176

THE GENERAL GEOGRAPHY OF ALASKA. BY HENRY GANNETT, CHIEF GEOGRAPHER, U. S. GEOLOGICAL SURVEY. ILLUSTRATED 180

GEORGE M. DAWSON. ILLUSTRATED 197

GEOGRAPHIC NOTES. ILLUSTRATED 199

GEOGRAPHIC LITERATURE 207

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY . 208

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Edited by

Professor J. McKeen Cattell

THE POPULAR SCIENCE MONTHLY for May contains a series of articles of interest not only to students of science, but to all readers who wish to keep informed of scientific progress, even though they may have no special scientific knowledge. The number opens with an article by Dr. W. J. Holland, Director of the Carnegie Museum at Pittsburg, describing the institution which Mr. Carnegie has so liberally endowed, and which it is said he intends to make the greatest institution of its character in the world. The article is fully illustrated, and includes plans for the enlargement made possible by Mr. Carnegie's recent gift of $3,000,000. President David Starr Jordan, of the Leland Stanford Jr. University, contributes an article entitled "The Blood of the Nation," in which, as a student of the theory of biological evolution, he points out the causes which lead to national efficiency and to degeneration by the survival of the unfit. Dr. Frederick A. Cook, one of the members of the Antarctic Expedition that penetrated furthest south, describes the auroras of the southern sky, which have never before been portrayed and illustrated. Professor R. H. Thurston, Director of Sibley College, Cornell University, contributes an article on the progress and tendency of mechanical engineering during the nineteenth century, a subject of very general interest treated by the most competent authority in America. Brother Potamain, Professor of Physics in Manhattan College, gives an account of Gilbert of Colchester, the founder of modern magnetism and electricity, the tercentenary of whose death is being celebrated this year. Professor E. A. Andrews, of the Johns Hopkins University, in an illustrated article describes many interesting and curious facts regarding frogs that take care of their young. Mr. Havelock Ellis, Editor of the Contemporary Science Series, continues his study of British genius, the present article being devoted to childhood, youth and education. The number, as usual, contains short contributions, giving the most recent information regarding scientific literature and scientific progress.

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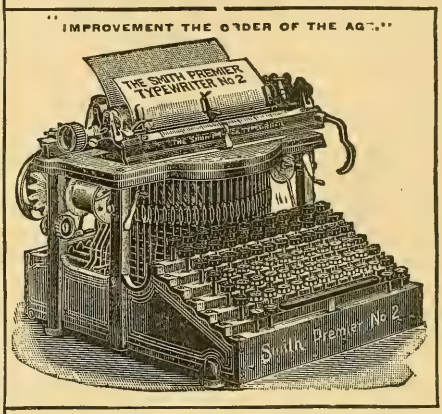

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE LATIN-AMERICAN CONSTITUTIONS AND REVOLUTIONS

By John W. Foster, Ex-Secretary of State

On attaining their independence, the Latin-American republics modeled their forms of government after that of the United States. In almost all their constitutions the article relating to the executive power, like that of the United States, contained no prohibition against the reëlection of the President. But a bitter and bloody experience has caused them, with nearly the same degree of unanimity, to revise their constitutions in this respect.

The provisions of the existing constitutions of those countries relating to the executive may be briefly enumerated as follows: In Mexico the president is chosen for four years by an electoral college, and no prohibition exists against a reëlection. The cause of this exception to the general practice will be referred to later. The secretary of foreign relations succeeds to the presidency on the death or disability of the president and orders a new election. In the five Central American States the provisions vary as to the manner of election and term of office, but in most of them the president is made ineligible for reëlection for the next succeeding term. So, also the prohibition against reëlection to be noted in the countries which follow is in almost all cases for the next succeeding term only. In Colombia the president is chosen by an electoral college for a period of six years, and is made ineligible for reëlection. Ecuador elects its president by the direct vote of the people for the term of four years, and he cannot be reëlected. The vice-president is elected for the same term, but two years after the president. Peru elects its president by a direct popular vote for four years, and he is made ineligible for the next four years. Two vice-presidents are elected. Bolivia has the same provision as Peru. In Chile the president is elected by delegates chosen by the people for the term of five years, and he is made ineligible for the next term. The Argentine Republic elects its president by electors chosen by the fourteen provinces for six years, and both the president and vice-president are declared ineligible for reëlection. In Uruguay the president is elected for four years, and made ineligible for the suc-

ceeding term. In Paraguay the president is chosen by a direct vote of the people for four years, and both president and vice-president are non-eligible for eight years. Brazil, the last of these countries to assume a republican form of government, and profiting by the experience of its neighbors, provided for the election of its president by a direct vote of the people for four years, and made him ineligible for reëlection. Its constitution also contains a provision that the candidates must not be related by blood or marriage to the outgoing president or vice-president in the first or second degree. In Venezuela the choice of the chief executive is somewhat complicated. Congress consists of two houses, the representatives being elected for two years by the people, and the senators for four years by the state legislatures. A federal council of nineteen members is chosen every two years by the congress, who elects a presiding officer from their own number, and he is president of the republic for the two years. Neither the president nor council can be reëlected for the next term.

When these countries declared their independence and first essayed the practice of republican government, they soon found that the greatest danger to their institutions arose from the disposition of the chief executives to prolong their power by continuance in office, in violation of the constitutional provision. Iturbide, the first president of Mexico, betrayed his trust, declared himself emperor, and dissolved the congress by force, precipitating the country into revolution and paying the penalty with his life.

Simon Bolívar, the most renowned of the Spanish-American patriots and the one who did most to achieve the independence of the South American countries, marked his entire career by overriding their constitutional provisions as to the executive and by assuming dictatorial powers. As early as 1813 he captured Caracas from the Spaniards and set up the government of Venezuela, but he at once declared himself dictator, established a court and bodyguard, and assumed royal dignities. He soon became unpopular, met with reverses, and had to flee the country. Returning after some years, he led the insurrectionary movement which gave final independence to Venezuela and Colombia, and thence went to the aid of the struggling Peruvian patriots, achieved their independence, and was made dictator of that country. Having failed in his effort to secure a provision in the constitution making himself president for life, he returned to Colombia, where he was chosen president of the united states of Colombia and Venezuela. Seeking in vain to secure a constitutional provision giving him practically absolute power, he declared himself dictator. Being suspected of desiring to make himself a king, he lost his popularity, was driven from power, and died in retirement. He was called "the Washington of South America," but beyond his gallant services in securing the independence of the northern states of South America, he had little in common with Washington in his conduct or character. The example of the latter was lost upon him when he rejected the offer of the American army to make him king, and when, after having enjoyed the free suffrages of his countrymen as President, he voluntarily laid down the great office and retired to private life.

If the history of the Latin American republics is carefully examined it will be seen that the cause of most of the revolutions which have darkened its pages, decimated their population, and retarded their development has had its origin in the efforts of the public men of those countries to continue themselves in power or to attain the presidency by other than peaceful and constitutional methods. With rare excep-

tions the revolutions and bloody contests of these republics for the past three-quarters of a century have been purely of a personal character, the struggles of the partisans of one aspiring individual against the partisans of his ambitious opponent. One of the most notable exceptions was the war of reform waged in Mexico for ten years, beginning in 1857, by the liberal party against the united power of the clergy and Emperor Napoleon. That was a heroic war, involving great principles of government.

I can probably best illustrate the historical fact of this personal cause of revolutions by a very brief sketch of the experience of two of these republics—one the most revolutionary and the other the most conservative and prosperous of the Spanish-American countries.

Venezuela, on its separation from Colombia in 1831, chose Paez president. He filled out his term, and in 1835 sought by his official influence to transfer the presidency to Vargas, who was very unpopular, and within four months was overthrown and banished. Paez came from retirement, gathered an army, took the capital, reinstated Vargas, and, ultimately succeeding him, was made dictator. In 1847 he transferred the presidency, against the protest of congress, to Monagas, who caused his soldiers to invade the assembly, killing some and dispersing the rest. Paez finally took up arms against the government, but was outlawed, defeated, and escaped to New York. In the election to succeed Monagas three candidates were in the field, and as none had the constitutional majority, the election went to congress, and Monagas' brother Gregorio was selected, and until 1858 the two brothers alternated in the presidency. In that year their career ended by a revolution, which created a provisional government that brought in Castro as president; but his was a turbulent reign, and he was displaced by Gual, who tried and convicted Castro as a traitor and then pardoned him. Tovar succeeded by election to the presidency, and he recalled Paez and made him commander-in-chief of the army, but the latter quarreled with Tovar, compelled him to abdicate, and placed Gual again in the presidency. Gual likewise lost the favor of Paez, the president and his ministers were imprisoned, and Paez was declared dictator. Revolution and anarchy followed for two years, when Paez and his partisan, Rojas, had to surrender the government to the insurgents under Falcon in 1863. A constituent assembly and a new constitution followed in 1864, and Falcon, the insurgent leader, was declared president, and he turned the government over to his partisan, Trias, which occasioned a new revolution, and general anarchy and financial distress prevailed. In 1867 congress gave unlimited powers to the president, but the next year Monagas, after defeating Falcon, succeeded to the presidency, and died in office. His adherents made Pulgar provisional president, but the Falcon party, led by General Guzman Blanco, were enabled to overturn the provisional government, and Blanco entered upon his checkered career, covering several years, in which he assumed dictatorial powers, to be at last rejected by his country, and he spent the last years of his life in Paris, enjoying luxurious ease with his ill-gotten fortune. He was followed by a list of constitutional and revolutionary rulers, in turn, up to the actual president, Castro, who came to power through force and betrayal of his chief.

Let us turn from this dismal narrative to a less dreary story, but one which illustrates as well the point which I am seeking to make clear. Chile has had from the beginning of its existence a more fortunate career, in that its wealthy and more intelligent citizens have usually controlled the government, and as a result it has prospered and its financial credit has led all the other states. But

it will be seen that when private animosities or personal ambitions were awakened, constitutional provisions were of little avail. After Chilian independence was secured, General O'Higgins was called to the head of the government and became dictator, but he was finally driven from power by a revolution and Freire was chosen president in 1823. He remained in office three years, but was troubled with frequent insurrections, and the four years following his retirement saw six dictators. In 1828 a new constitution was promulgated, and in 1831 Prieto was chosen president, and from that date for many years a constitutional form of government was enjoyed, although defeated candidates for the presidency more than once organized unsuccessful revolutions on the ground that they had been defrauded in the elections. In 1890, near the close of Balmaceda's term, he was suspected of selecting the chief of his cabinet to be his successor. This choice was contrary to the wishes of the majority of the congress, which body refused to vote the budget appropriations, and Balmaceda retaliated by dissolving congress. The leaders of the latter went on board the government fleet, which pronounced in favor of the Congressional party, and thus a revolution was inaugurated which resulted in the overthrow of Balmaceda. One of its evil effects was to bring about complications with the United States nearly ending in war, and which have embittered the Chilians strongly against our Government.

The record of all the Latin-American republics has not been as bad as that of Venezuela, though some of them equal it in their history of anarchy and misrule, and few, if any, of them have even as clear a record as that of Chile; but they all teach the same lesson of inability to respect the constitutional provision as to the executive power, when a fierce electoral campaign is carried on. Such a test as came to the Congress of the United States following the Jefferson-Adams campaign of 1800, the Jackson-Adams-Crawford-Clay campaign of 1824, or the Hayes-Tilden campaign of 1876, would almost inevitably bring about a revolution or a disregard of the constitution in any of the Latin-American States.

The experience of the past year demonstrates the lesson of their history. We have been reading the almost daily reports of the revolutionary movements in Venezuela and Colombia. The disorders in Venezuela had their origin in the election about three years ago, when Andrade was declared to be chosen president over his competitor, Hernandez. The latter contended that he was the real choice, and his partisan, General Castro, took up arms to place his candidate in the executive chair. Castro defeated the government forces and drove Andrade from the country, but in place of installing Hernandez in power Castro imprisoned him, and declared himself president. Hernandez succeeded in escaping, and both he and Andrade are now reported to be seeking to drive the usurper from power; but even if Castro is displaced the two claimants will still have their own contest to settle. A late telegram states that a constitutional convention has been convoked by Castro, and that this body will frame a new constitution, with an article extending the president's term of office from two to seven years.

President McKinley, in his last annual message, stated that "the executive power of Colombia changed hands in August last by the act of Vice-President Marroquin in assuming the reins of government during the absence of President San Clemente from the capital." This gave rise to armed resistance, and we have had for months the periodical announcement that the revolution had been put down, only to break out again with fresh vigor. The diplomatic representative of the revolutionists recently announced from New York that

"the liberals will never consent to serve again under a president forced upon the people by the conservatives." The New York *Independent*, in seeking to give its readers an account of affairs, says: "The revolution in Colombia that was said to be put down some months ago is alive again and widespread. It is a most remarkable fact that this revolution has caused the loss of thousands upon thousands of lives, and yet no one seems to know anything about it. Cities are taken and retaken, generals are killed, neighboring republics are accused of helping the insurgents, business is paralyzed, towns are razed to the ground, and yet there seems to be no principle involved, nor wrong to be redressed by either party's victory."

I have noticed the provision of the constitution of Brazil, one of the most recent, which, in addition to the prohibition of reëlection, makes ineligible to the presidency candidates related by blood or marriage to the outgoing president in the first or second degree. This is intended to strike at an evil akin to the continuance in power of the incumbent—the perpetuation of the same family influence in the executive office. We have seen that in Venezuela two brothers alternated for some years in the presidency, until overthrown by revolution. Two of these republics are today governed by the same family, one president making way at the end of his term for another member of the family.

Owing to the sad experience of the past, the Latin-American States have, as we have seen, with a great degree of unanimity attempted to remedy the evil by inserting in their constitutions a prohibition against the reëlection of the chief executive; but that has proved in many cases a most ineffectual remedy, because the men who are ready to resort to arms to secure what they claim as their rights seldom hesitate to disregard the constitution, or else find means to amend it to suit the exigency.

I have referred to the fact that one of the exceptions in existing constitutional prohibitions of reëlection is to be found in the fundamental code of Mexico. The circumstances which have brought this about are peculiar and interesting. The constitution of 1857, still in force, contained no such prohibition. General Porfirio Diaz was twice a candidate for president against Juarez, and he claimed that he was the people's choice, but had been counted out by the administration officials who had control of the elections. Lerdo, the head of the cabinet, became president upon the death of Juarez, and when the time approached for the election upon the expiration of Lerdo's term, Diaz announced to the country that it was useless to stand as a candidate, because of the absolute control of the electoral college by the government. He therefore issued a *pronunciamento*, declaring for an amendment of the constitution, and with the cry of "no reelection," he organized a revolution which was successful. Lerdo and his cabinet fled to the United States, Diaz assumed the presidency, ordered a new election, and was unanimously chosen. The constitution was in due course amended so as to prohibit the reëlection of the president until four years after his first term had expired.

At the end of his term Diaz retired from office, and his favorite general was elected his successor. The latter proved so inefficient and dishonest that at the end of his term all classes clamored for the return of Diaz, whose first administration had been quite a successful one. His second term was even more successful than the first. Peace and security prevailed throughout the land. Commerce, agriculture, mining—every industry of the country—prospered as never before. Railroads were built, capital began to flow in from abroad, the government credit, which had been utterly discredited for nearly half a century, was fully reëstablished. No one

would listen to his retirement, and so the prohibiting amendment was stricken out of the constitution, and Diaz was again chosen president; and he has again and again been reëlected without any open protest, and for a quarter of a century he has been the untrammeled ruler of Mexico. Every one conversant with the history of that country concedes that he is the best ruler it has had since the independence. He has given it peace, order, and the reign of law. It has risen phœnix-like from the ashes of anarchy and commercial death, and the praises of Diaz as an administrator and a patriot are sounded at home and abroad.

But what becomes of the principles of republican government? Diaz, through his strength of character and wise government, has been the supreme ruler, although acting through the channels of constitutional authority and representative institutions. This example may raise the doubt whether republicanism in its extreme form is adapted to these countries, or whether some limitations should not be placed upon it. The present is probably Diaz' last term, as he is now past seventy, and I believe he is sincere in his expressed desire to retire to private life. The test of republican government will come when his successors are to be chosen. Not the first, but probably the second term will test the ability of the Mexicans to choose their rulers in peace and observe republican practices. Mexico, like its southern neighbors, has not yet fully proven its capacity to consistently follow these practices and to peacefully and by constitutional methods transmit the executive power from one ruler to another.

How far the people of these countries are fitted to carry on republican and representative government in our sense opens up a topic which cannot be pursued in this paper; but I offer a few suggestions by way of explanation of the apparent failure in many of them. First, the great mass of their populations are ignorant and uneducated; in many of the countries they do not even read and write the official language of their government, and as a rule take no part in the elections. They, however, compose in the main the armies of the government and the revolutions. Second, the people of these countries, both the educated and the uneducated, had no experience in self-government before their independence. In this respect the British-American colonies had a great advantage over them, and we should be charitable in our criticism of them. The misfortune is, however, that they have had very little practice in genuine republican government since their independence. They understand the force of the bullet much more than the ballot. The result has been the rule of the dictator or usurper more often than that of the real representative of the people. The intelligent men, the best citizens, and the property-holders deplore the revolutions, and they are exerting themselves to put an end to these practices, and their good work is apparent in some of the countries, and I think the general tendency is toward orderly and constitutional government.

This subject has a special interest for the people of the United States:

First. It raises the question how far it is the duty of our Government to interpose respecting an American republic, which has fallen into anarchy, against the encroachments of European powers whose subjects have suffered outrages at the hands of the local military powers? I fully sympathize with the Cleveland administration in its action on the Venezuelan boundary question, but many Americans thought it would have been better for the interests directly concerned if all the territory in dispute had fallen under British sovereignty.

Second. We are often embarrassed as a nation by these frequent revolutions. I have noted how near we came to war

with Chile because of its disturbed condition and the enmity engendered by the action of our Government. We have commerce with all these countries, many of our citizens have invested capital therein, and these interests cannot fail to be injured by the civil disorder occasioned by the strife of ambitious men. Does any one believe that our Government could look on with indifference if our next door neighbor, Mexico, should again fall into anarchy, as at frequent intervals in the past, and the millions of American capital which has been attracted thither by the beneficent rule of Diaz should become the prey of revolutionists and rival aspirants for the presidency?

Third. The Spanish war has made the subject a practical problem for us. The territory which we took from Mexico was soon overrun by Americans, and its government was readily adapted to our system. But Porto Rico is already densely populated with people educated in Spanish-American methods of government. We have already had an exhibition of the embarrassments to be overcome. In the first election held under the territorial organization provided by Congress a practice was resorted to very common in the Latin-American republics—when one party finds itself outnumbered or outwitted in the campaign, it abstains in a body from the election, and then cries fraud or force. We read that in the late election in Porto Rico for the territorial legislature and other offices, one party, the Federals, refused to go to the polls, and the Republicans, as a consequence, elected all their candidates; but in celebrating the victory they were attacked by the Federals, and several were killed and wounded in the affray.

We have by act of Congress become responsible for the establishment and maintenance of a stable government in Cuba. The history of their brethren of the same race in Central and South America does not give much assurance that the Cubans will soon attain the position required by Congress. One of the first steps in that direction which is foreshadowed, the election to the presidency of a professional revolutionist, born and educated in San Domingo, does not argue well for the future. In the election held to choose delegates to the convention to frame a constitution, only a minority of the qualified electors took part, and I have good authority for the statement that fully 95 per cent of the electors representing the property interests of the island abstained from the election.

And yet it appears that this minority of the people of Cuba are to frame its organic code, to set the machinery of the new government in motion, and to determine the relations which are to exist between the new government and the United States.

This review, it must be confessed, does not present a cheerful outlook for the friends and admirers of republican government, but for the citizens of the United States at least it suggests a solace. It is a consolation to us to know that the men who laid the foundations of our Government and have thus far conducted its affairs have appreciated the value of peace and the superior merits of the ballot over the bayonet; that ew had a Washington, not a Bolívar nor an Iturbide, to put the Government in motion, and that the Constitution has been held as too sacred an instrument to be made the sport of ambitious rivals for the presidency.

MEXICO OF TODAY*

By Senor Dr. Don Juan N. Navarro, Consul-General of Mexico in New York City

A GLANCE at our factories shows that our people manufacture acids, chemicals, candles, excellent beer and ale, carpets, furniture, and carriages that have received premiums at some of the Paris expositions, cordage, glassware, hats, matches, paper of every description, sugar, tobacco, and many other articles, the production of which increases every day in quantity and quality. In the last few years the textile industry of Mexico has progressed at a surprising rate, and some of the manufactories deserve special mention. Rio Blanco is a manufactory situated near Orizaba. I personally visited this manufactory a few months ago and found that it produces eighty different classes of linen and cotton goods, has a colossal and tasteful building, and maintains in incessant work more than 3,000 workmen, who make 40,000 pieces per week. I have in my office, in New York, a complete set of samples of all the linen and cotton goods from this manufactory, and all, especially the prints, in the perfection of the work and in the beauty and taste of colors and designs, excite the admiration of all who examine them.

I have not at hand the statistics giving the actual number of cotton manufactories, but I calculate that there must be approximately 150, and that they last year produced more than ten millions of pieces of white and printed goods and nearly two millions of yarn. The sales declared for taxes for the years 1898 and 1899 are more than $29,700,000. Another of the manufactories near the city of Orizaba makes bags for flour, grain, salt, etc. The raw material is jute, a fiber originally imported from East India, which has been planted in Mexico and in all probability will yield a good harvest. This establishment makes 7,000 bags per day and 800 meters of carpets and rugs of the same material. The motive power in these factories is electricity derived from the falls of the Rio Blanco.

The wool manufactories, though not so many, are remarkable for the excellence of their products, and are not often excelled by the best products of other countries. The number of tobacco manufactories is very considerable, and the fame of the excellence of the material and elaboration is spreading day by day in the commerce of the world. Another manufactory worthy of mention is the one in Merida for cordage. The capital invested in mounting it was $600,000, and up to September of last year there were exported to this country by way of the port of Progreso more than two millions of kilos of the *henequen* cordage there manufactured.

Our government has promised certain privileges for the introduction of new industries into the country, and the department for correspondence has received 114 applications.

I have always believed that Mexico is destined to be not only an agricultural but an industrial country, as it produces a great number of vegetable raw materials and possesses an incomparable quantity of every known metal, and has living in cities a good part of its population who have a decided inclination and a remarkable ability for mechanical labor. The facts of her development are confirming these views.

* Continued from the April number.

The scientific boards and establishments of the government render good services to science in general and particularly to our country. There is a geodesical board that, besides other scientific occupations, is measuring the part of the arc of the meridian corresponding to Mexico.

La Comisión Geografica Exploradora (the geographical exploring board), in order to make a correct map of the republic on a large scale, is now working in the States of Nuevo Leon, Vera Cruz, and Tamaulipas. The topographical surveys measure an area of 424,148 square kilometers, the itineraries 142,799 lineal kilometers, and the number of positions astronomically determined is 424. The learned members of this Society can appreciate properly the time and scientific labor represented by these operations.

Our astronomical observatory in Tacubaya, Federal District, is in constant communication with similar institutions in the civilized world, and our directors have visited them repeatedly and been present at the astronomical congresses of all nations. It has also the honor of taking part in the formation of a photographic zone of the celestial map that is to be executed by international convention.

Speaking of this science, it is worth mentioning that Mexico, since colonial times, has always had remarkable astronomers, and in the seventeenth century the illustrious Don Carlos de Sigüenza y Gongora, of European renown, was appointed by Charles II of Spain his royal cosmographer. In our times we had Diaz Covarrubias, and in fact Mexico, since the sixteenth century, has taken a prominent part in all astronomical observations, and was one of the many countries to observe the transit of Venus through the disc of the sun more than 100 years ago.

There are also meteorological observatories in connection with those of the United States, and a geological institute, one of whose works, the geological cut from Acapulco to Vera Cruz, figured very advantageously in the last Paris Exposition, and many other scientific institutions supported by public funds or by private enterprise.

To give some idea of our means of communication and public works, I shall mention some facts about our railroads, telegraphs, telephones, and postal service, and of some of the great works in the capital and states.

Besides many hundreds of miles of railways in active construction, we have in actual operation 14,573 kilometers, or 9,055.22 English miles. In the last four years 3,104 kilometers of roads were finished.

Mexico being a mountainous country, the cost of these roads in many cases was enormous; but we can boast of having some of the most daring and magnificent works of engineering and of the most picturesque views in the world. One of the two railroads connecting the capital with the port of Vera Cruz has a section literally above the clouds, and, according to the opinion of foreigners visiting the country, the trip of any tourist would be amply repaid by only traveling on that magnificent railroad, so solidly and skillfully built and cautiously run that an accident of a serious nature has never happened in more than 28 years of continual operation. For construction and splendid scenery, the railroads running from Morelia to Uruapan, in the state of Michoacan, and from Puebla to Oaxaca, connecting the two states of said names, can be especially recommended.

The number of passengers increases at an enormous rate year by year. In 1893, 22,781,343 passengers were carried on Mexican railways; in 1900 this number had nearly doubled, exceeding 40,000,000. Of merchandise, 3,798,360 tons were carried in 1893, and in 1900 nearly 8,000,000 tons.

The development of our telegraphs has kept pace with the railroads, and today there is not a place of any importance that is not connected telegraphically with the rest of the republic.

Our telegraphic lines are divided into four different branches—federal lines, state lines, private company lines, and railroad lines—and the federal lines last November had an extension of 45,740 kilometers, or 28,421 English miles. President Diaz in his last report mentions only the federal lines, but, according to the statistical annuary, of the state lines there were, on December 1, 1898, 8,659.4 kilometers; of lines belonging to private companies, 3,690.240 kilometers, and of railroad lines, 11,198.195 kilometers. Adding these lines to the 45,740 kilometers of federal wire and we have a total of 69,287.881 kilometers, or about 43,053 miles.

The extension of telephone lines in December, 1898, was 28,433 kilometers, but in the last two years many more lines have been constructed, and we can estimate that there are now 30,000 kilometers, equivalent to about 18,641 English miles. The number of messages transmitted by federal telegraph only during the year 1892-'93 were 1,083,359, and during the last year, 1899–1900, this number had more than doubled.

The federal offices in the capital and other principal ones are open day and night, and the night service has been so well patronized by the public that it covered its expenses almost immediately after being established.

Our telegraph lines are connected at different points with those of the United States and by two submarine cables—one from Galveston to Tampico and the other from Tampico to Vera Cruz. Through the United States we are in communication with any part of Europe, while the United States, through our telegraph lines from the Atlantic to the Pacific Ocean and a cable from Salina Cruz to Libertad, communicates with the greater part of South America as far as Brazil and Chile, and by land with Guatemala and the other Central American republics. We have one telegraph cable at Alvarado Bar, and three others between Tuxtepec and Cosamaloapam, another between Champoton and Campeche, and one between San Juan Bautista and Nopalapam.

Our government has established a school of telegraphy where girls receive gratuitous instruction.

Our postal system is continually studied and improved, and the results obtained are of the most gratifying order. The number of offices in 1900 was 1,972, including 96 on railroad cars.

The public works completed and those in the course of construction are too numerous to mention. Two, however, the drainage canal of the valley and city of Mexico and the great docks and wharves in the port of Vera Cruz, deserve special consideration, because of their colossal magnitude and importance.

The city of Mexico is situated in an extensive and beautiful level valley, surrounded by lofty mountains. There is no natural exit for the water that pours from the mountains or for the refuse of a large city. In consequence the inhabitants were exposed to the perils of floods which at different times in the past became a reality. The Spanish Government early took the matter in hand and approved the project of the celebrated engineer, Enrico Martinez. He constructed the gigantic cut now in existence and known by the name of "Tajo de Nochistongo." But, although that work had averted the danger from the side of Cuautitlán, deviating the course of the river of that name, it did not solve the whole problem. The solution as completed was first proposed by another Spanish engineer, Simon Mendez, whose plans, with some modifications, constitute the work now finished.

The work was undertaken and suspended several different times for the want of funds and the uncertainties produced by revolutions.

In the year 1885 it was resumed in earnest, and incessantly and vigorously prosecuted until its completion, by General Diaz, who, with his usual activity and energy, put it under the direction of a board of distinguished citizens. The Mexican engineer, Dr. Luis Espinosa, was the technical director, who modified advantageously the original plan and brought it to a happy termination with an ability, energy, and constancy that deserve the gratitude and admiration of all his fellow-citizens.

The completed works consist of a canal, with a length of 30 miles, and a tunnel of more than six miles. The canal runs from the northeastern section of the city, called San Lazaro, to the town of Zumpango. There the enormous mass of water enters the tunnel cut through the mountain, and on the other side disgorges into the ravine or Barranca de Tequisquiac, in which it is confined till it reaches the Gulf of Mexico. The works are laid out in such a way that when the system of canalization of the streets of the city is finished, according to the plans presented by another distinguished engineer, Dr. Roberto Gayol, the water of the lakes, principally of Texcoco, which is the lowest, will be controlled, and Mexico will be perhaps the only city in the world which will be able to wash its sewers every day. This last work is being vigorously pushed, and it is expected will be completed during the last months of the present year. Mexico has good reason to be proud of this magnificent work, which has cost her many millions of dollars.

A few words will give some idea of the magnitude and usefulness of the public works in the port of Vera Cruz. The city of Vera Cruz was founded by the Spaniards for military and not for commercial purposes. It was planted within the fire of the guns of the fortress, San Juan de Ulua, which they had built on a rock in the bay. The port was a bay, or rather an open roadstead, where ships could find no protection in a storm. Often the shipmasters preferred to lift anchor and battle with a tempest on the high seas. Today the old fortress is a part of the city, and can be reached by carriage, and the open roadstead has been converted into a safe port, with wharves for the largest vessels and every convenience for the landing of passengers and the loading and unloading of ships.

In many other ports on the Gulf and the Pacific Ocean improvements are being constantly made In Tampico a new wharf is nearly completed to replace the one destroyed by fire in 1888. In San Juan Bautista four wharves have been finished. The fiscal wharf in Frontera is completed and in use, and also the one in Progreso. Very important works are in progress in the ports of Salina Cruz, the Pacific end of the Tehuantepec Inter-Oceanic Railroad, and Altata, a port that is to be changed to Tetuan, which offers a better anchorage for vessels.

In the last four years many lighthouses have been built on the coast of Yucatán, in Isla de Mujeres, Cayo Norte, Cabo Catoche, Contoy, Punta Molar, and Punta Calarain and on the Pacific coast, on Morros de Seybaplaya, Salina Cruz, Santiaguillo, Isla de Arcas, Zapotitlan, Cayo Lobos, and Puerto Angel.

(To be concluded in the June number.)

THE GENERAL GEOGRAPHY OF ALASKA

By Henry Gannett, Chief Geographer, United States Geological Survey

ALASKA, our northernmost possession, extends over more than 20 degrees of latitude and 45 degrees of longitude—as far as from Florida to Maine and from Maine to Utah.* From the main body of the Territory stretch two projections, one to the southeast, comprising the Alexander Archipelago and the adjacent mainland, the other to the southwest, comprising the Alaska Peninsula and the Aleutian Islands.

The exact area of Alaska cannot at present be known, owing to the fact that the boundaries are as yet located only approximately. The seacoast, which forms by far the greater part of the boundary, has not been accurately mapped, except in small part, while the land boundary on the southeast, which separates our territory from Canada, has not been defined, except in the general terms of the treaty of cession from Russia. Various measurements have been made, based upon different maps, giving areas ranging from 570,000 to 600,000 square miles. A careful recent measurement from the large map published by the U. S. Coast and Geodetic Survey (scale 1:1,200,000) gives its area as 590,884 square miles. Of this the portion lying east of the 141st meridian, popularly known as southeastern Alaska, which is the best known part of the Territory, has an area of 43,710 square miles, of which 30,800 square miles consist of mainland and 12,910 square miles of islands, forming what is known as the Alexander Archipelago.

The Cordillera of North America enters Alaska at its southeastern extremity and follows the Pacific coast around to the Aleutian Islands. Beyond this mountain system and following its general trend is a broad depression, drained by the Yukon River and its tributaries. North of this basin is a height of land which separates the Yukon Valley from the bleak shores of the Arctic Ocean.

THE PACIFIC COAST REGION

This portion of the Territory is mountainous throughout. Although the coast of the mainland and of the islands is, altogether, several thousand miles in length, yet for the entire distance there are very few square miles of level ground. The land rises from the water almost everywhere at steep angles, without a sign of beach, to altitudes of thousands of feet. It is a fiord coast. The islands are separated from one another and from the mainland by fiords, deep gorges, whose bottoms are in some cases thousands of feet below the surface of the water. These fiords extend far up into the mainland and into the islands, in deep, narrow U-shaped inlets.

The relief features of this region, its mountains and its gorges, partly filled by the sea, are all of glacial origin, presenting everywhere the familiar handwriting of ice. Every cañon, every water passage, whether called strait, canal, or bay, is a U-shaped gorge, and its branches are similar gorges commonly at higher levels—"hanging valleys" they have been called. Above

*It lies between latitudes 51° and 71° 30′, extending 5 degrees within the Arctic Circle, and stretches from longitude 130° to 175°. The great body of the Territory lies, however, between latitudes 60° and 71° 30′, and between longitude 141° and 168°.

the cliffs of the gorges the mountains rise by gentle slopes to the base of the peaks. The cross profile of each gorge and its surroundings is that of ice, not of water carving. It is the work of channel erosion, not of valley erosion, and the channels were filled with ice. It is a colossal exhibition of the eroding power of water in solid form. From Lynn Canal, a fiord 90 miles in length, there have been carried off and dumped into the Pacific more than 200 cubic miles of rock, and from all the fiords of southeastern Alaska the amount removed may be safely estimated at thousands of cubic miles. The ice has but recently retreated from these gorges, for since its retreat water has done but little work, although the region is one of heavy rainfall and extremely steep slopes, where aqueous erosion is at a maximum.

Of the great glaciers which occupied this region a short time ago, only trifling fragments remain in the upper ends of the gorges, and comparatively few now reach the sea. I use the word trifling, however, merely in relation to their former extent, for absolutely these remnants are not at all trifling. The ice cap of Greenland and the glaciers of the Antarctic continent alone exceed them in magnitude. All the glaciers of Switzerland together would form but a few rivulets of ice on the surface of the great Muir Glacier, and the Muir is but one of many glaciers of equal magnitude. Indeed, on this coast are scores of live glaciers, glaciers which reach the sea, presenting to it fronts of ice or ice walls rising from the sea bottom to 200 or 300 feet above its surface, and several miles in length, and which drop bergs, with thundering sound, into the sea. Of such glaciers no fewer than 30 were visited by the Harriman Expedition, and many others are known. Of dead glaciers, or those whose fronts do not reach the sea, hundreds are known.

The mountains increase in height toward the northwest, but not at a uniform rate. They culminate near the coast in the Fairweather Range, south of Yakutat Bay, at about 16,000 feet, and in the St. Elias Range, west of Yakutat Bay, at 18,000 feet or more. These ranges are not regular or continuous. While they follow the general direction of the coast, toward the northwest, they are extremely broken, being cut through on the mainland by many fiords and by streams flowing into the heads of the fiords. The Stikine, which reaches the coast near Wrangell, heads far to the eastward, in Canada, and cuts across the entire breadth of the Cordillera system. The same is true of the Taku River, which, flowing through Taku Inlet, reaches the coast near Juneau; and of the Chilkat, which flows into one of the heads of Lynn Canal. Alsek River heads far to the north, in Canada, and cuts a gorge through the great Fairweather Range. These are the main rivers of this coast, but there are many smaller ones, which head either beyond the mountains to the north and east, or far within them.

The coast line from Cross Sound northwestward to Prince William Sound is comparatively smooth and simple, containing no inlet of magnitude, with the exception of Yakutat Bay. As far as Yakutat Bay it is closely bordered by the Fairweather Range, which rises abruptly from 10,000 to 16,000 feet almost from the water's edge, bearing on the summit a succession of peaks and covered with glaciers along both slopes. A day long to be remembered was that on which our ship steamed, between 8 o'clock in the morning and 6 in the afternoon, from Yakutat Bay to Cross Sound, along the entire front of this range outlined against a cloudless sky.

Yakutat Bay is a deep funnel-shaped bay, penetrating far into the heart of the mountain region. At its apparent head it turns sharply upon itself to the south and extends back nearly to the

sea in a narrow fiord, bordered on either side by high mountain walls. This extension, heretofore named Disenchantment Bay, has been rechristened. The story of the locality is as follows: More than a century ago Malaspina, the Spanish navigator, entered Yakutat Bay while in search of the Northwest Passage. Sailing on up the bay and finding that open water extended far inland, he for a time thought that for him had been reserved the fame and satisfaction of discovering the long-sought route through the North American continent. His dream was short, however, for on nearing the bend in the bay he found his way blocked by a solid wall of ice. This ice was the front of the combined Hubbard and Turner glaciers, which then extended far beyond their present limits, completely closing the entrance to the fiord above, which at that time was probably an open lake some 200 feet above the level of the sea and overflowing southward into the Pacific. In memory of his disappointment, Malaspina named the upper part of Yakutat Bay "Disenchantment Bay."

Prof. I. C. Russell, when exploring the head of the bay in 1891, discovered the fiord, and in an open boat traversed it for its entire length. Instead of naming it, he extended the application of the name Disenchantment Bay to cover it. We have rechristened it, in honor of its discoverer and first explorer, Russell Fiord. Our ship, the *George W. Elder*, was the first large vessel to go to the head of this fiord. We made the passage under the pilotage of a Yakutat Indian, and lay at anchor over night at its head.

Northwest of Yakutat Bay for many miles the shore is covered by a field of ice, Malaspina Glacier, which is in the main a stagnant pool, wasting only under the heat of the summer sun, and supplied by ice streams from the St. Elias Alps, which border it on the north and east. Farther to the northwest stretches a low coast, rising into mountains a score or two of miles inland. Through these mountains flows Copper River, at whose mouth is an enormous delta, built up of detritus which it brings down from the interior.

Then comes Prince William Sound, a bay of irregular shape, with many tentacle-like fiords extending in various directions into the land. Its entrance is nearly closed by islands between which are several navigable passages. The islands near the shores are everywhere mountainous, and on the north shore mountains rise to about 10,000 feet, the higher ones everywhere skirted with glaciers, many of which come down into the sea. Several of the fiords are of great length, reaching far inland. Thus Port Valdez, up which the Copper River route to the interior passes, extends inland more than 30 miles, and Port Wells, on the northwest of Prince William Sound, pushes 40 miles into the interior, far up among the high mountains, and each of its branches terminates in a living glacier. Passage Canal, too, up which runs the portage route to Turnagain Arm of Cook Inlet, has a length of 30 miles.

Prince William Sound, in the mountainous character of its shores, in its multitude of islands and fiords, and in the almost total absence of level land, resembles southeastern Alaska. It was until recently but little known, all our information concerning it being derived from the explorations of Vancouver and Malaspina, made a century or more ago. Within the past two years, however (1898 and 1899), exploring parties under Captain Abercrombie and Captain Glenn have supplemented the work of Vancouver and Malaspina, and have added materially to our knowledge of the coast and adjacent lands. Some additional information also was gained by the Harriman Expedition, especially concerning Columbia Fiord and Glacier, and of Port Wells and its glaciers, in the form of sketch maps and photo-

graphs of these localities. The head of Port Wells and a large branch coming in from the west were explored and mapped. This western branch, shown on the sketch map as Harriman Fiord, was in all probability closed at no very remote time by the front of Barry Glacier, which extended across the fiord to the opposite shore; indeed, until our visit, it was still supposed to be closed. In bringing our ship close to the glacier front to obtain photographs of it, our party discovered the opening between its point and the land, and as we steamed through we saw unfolded before us a magnificent vista of mountain and glacier.

> "We were the first that ever burst
> Into that silent sea."

It was sunset when we entered the portals, and through the long twilight of the Arctic evening we passed up the fiord, with mile-high mountains and great glaciers on either hand. A little before midnight we reached its head, where it is terminated by the front of Harriman Glacier. A surveying party was landed there, and two days were spent in making a reconnoissance of the fiord and its surroundings. In this fiord, in a length of 15 miles, there are, besides a score of "dead" glaciers, five live glaciers, four of them of the first magnitude, and all reaching the sea and discharging bergs into it.

The general direction of the coast, which trends northwest to a point beyond Mount St. Elias, gradually swings to the westward, and beyond Prince William Sound turns toward the southwest in the Kenai Peninsula. Beyond the end of this are mountainous islands — Afognak (594 square miles) and Kadiak (3,642 square miles), the latter the largest island in Alaska waters. These continue the line of Kenai Peninsula to the southwest, and are separated by the waters of Cook Inlet and Shelikof Strait from the Alaska Peninsula. This latter peninsula bears the backbone of the mountain system which follows the coast, the westward extension of the Cordillera. Of its structure little is known, except that here and there are upturned stratified beds and occasional volcanoes, some extinct, others still smoking, as if the internal fires were banked but not extinguished. Among these are Redoubt, Iliamna, St. Augustine (on an island near the coast), Pavlof, and many others. Beyond the west end of the Alaska Peninsula its general direction is continued by groups of islands and islets, as if the mountain range of which it is composed were sunken below the sea and only the summits of its peaks protruded above the waves. These are the Aleutian Islands. Upon them also are many volcanoes, some alive, some dormant.

BERING SEA

Just north of the Aleutian Islands, which run in a broad curve, convex southward, over ten degrees of longitude, are two islands, Bogoslof and Greminck. These are very young, the older having come into being 104 years ago, the other being but 17 years of age. Only half a generation ago it rose from the sea with great fury and turmoil of escaping steam, and although for 17 years its shores have been bathed in the icy waters of Bering Sea and its summit wrapped almost constantly in chilling fogs, it is still hot and gives out steam. Its older brother has long since cooled and is now the nesting place of millions of birds and the breeding ground of hundreds of sea-lions.

North of these rocks, far in the gloom of the eternal fogs of Bering Sea, lie the Seal Islands, or Pribilofs, St. George and St. Paul—little islands of hills and gentle slopes of tundra, clothed in summer with a rich mantle of grass and flowers. Still farther north, in the midst of this dreary sea, where the sun seldom

shines, are St. Matthew and Hall Islands, buttressed by cliffs, above which are undulating slopes of tundra, grassy and gay with flowers, and beyond them St. Lawrence, a mountain island fringed by a boggy plain.

The Alaska coast of Bering Sea is mainly low and marshy, rising very gently inland, and consisting almost entirely of tundra. The Yukon, the great river of Alaska and one of the great rivers of the earth, ends its long journey seaward in an enormous delta, which covers thousands of square miles. Through this great area of low level land its distributaries meander sluggishly to the sea, bringing from the interior mud and gold and driftwood, to be spread along the coast by the currents.

Such is the Alaska coast: where it faces the Pacific, bold, rugged, and bordered throughout by a mountain barrier; where it faces Bering Sea, low, tundra-clothed, and affording easy access to the interior by means of its great river.

THE INTERIOR

Of the interior of Alaska we know much less than of its borders. Not only did the early explorers confine their attention almost entirely to its coasts, but the inhabitants, both natives and Europeans, owing to the difficulties of land travel in the interior, have always lived upon the coast or upon the larger streams, and have made their journeys by the water routes. It is only in recent years that definite geographic information concerning the interior has been obtained, and at present, through the extensive explorations carried on by the U. S. Geological Survey and officers of the U. S. Army, such information is rapidly increasing.

The primary slope of the land is toward the west and southwest, as is indicated by the courses of the great rivers of the Territory—the Yukon, Kuskokwim, Koyukuk, and others. The trend of the mountain uplifts, on the Pacific side, swings around from northwest to southwest, thus following the general course of the coast. Of the great features of the Territory this chain forms the southernmost, and is the key to the structure of the country. Succeeding it on the north is the great valley of the Yukon, which is separated from the Arctic coast by ranges of low mountains and broken country, probably nowhere exceeding 5,000 or 6,000 feet in altitude.

The Cordillera attains its greatest breadth and altitude between longitudes 142° and 152°. Here are many summits reputed to exceed 12,000 feet in height, with Mount Wrangell, said to be 17,500 feet, and Mount McKinley,* so far as known, the highest summit on the North American continent, rising to an altitude of 20,464 feet. In this portion of the mountain system are the sources of many large rivers, the White, a branch of the Yukon; the Copper, well named on account of the enormous deposits of copper ore found near it; the Sushitna, flowing into the head of Cook Inlet; the Tanana, another branch of the Yukon, and finally the Kuskokwim, which, heading in the western part of this group, flows southwest into Bering Sea. In the region north of the Yukon Valley originate many streams, including several large branches of the Yukon, as the Porcupine and Koyukuk; other streams, as the Noatak and Kowak, flow into Kotzebue Sound, and still others, as the Colville, flow northward into the Arctic Ocean.

The country is intersected by a network of rivers and lakes navigable for canoes, although navigation is much interrupted by rapids and falls. The great highway of the Territory is the Yukon River, which, heading in British Columbia, flows northwestward through a succession of lakes and rapids, and

* Longitude 149°, latitude 63°.

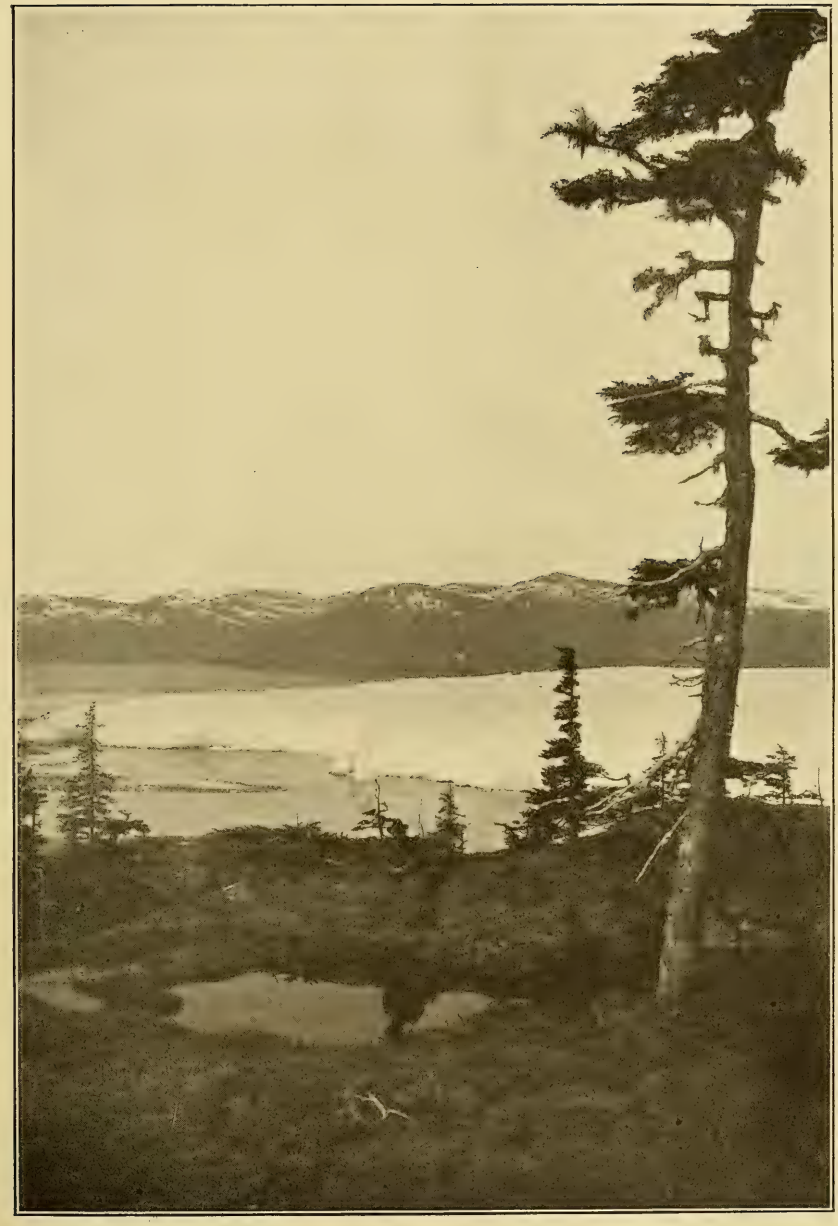


Photo by C. Hart Merriam

End of Columbia Glacier, College Fiord

crosses the boundary line in latitude 65°. It reaches its most northern point just on the Arctic Circle, in longitude 146°, and thence flows southwestward to its mouth. It is navigable for small steamers throughout its course in Alaska, and when not closed by ice—that is, from June to October—carries much traffic, since nearly all of the food, supplies, machinery, and other goods for the support of the mines in Alaska and the Klondike come by this route.

North of the Yukon most of the land is permanently frozen at a depth, thawing only near the surface in summer. Whenever the slopes are at all gentle such ground is marshy, forming the well-known tundra of the Arctic regions.

CLIMATE

We must speak of the climates rather than the climate of Alaska, for different parts of the Territory differ in climate, not in degree only, but in kind. The Pacific coast has a climate of its own, the coast of Bering Sea has another, and both differ widely from that of the interior.

The climate of the Pacific coast, from Portland Canal in the extreme southeast to Attu Island at the west end of the Aleutian chain, may be characterized, in a word, as "chilly." Take the well-known climate of San Francisco, with its dampness, fogs, and cold sea winds, reduce the temperature 15 to 18 degrees and increase the dampness and fog in proportion, and you have a fair idea of the climate of the Alaska Pacific coast. At Sitka, in latitude 57°, the mean annual temperature is 43° Fahrenheit, which is about the same as at Eastport, Maine, 12 degrees farther south. The extreme range of temperature on record

Photo by C. Hart Merriam

Amherst Glacier, College Fiord

Photo by C. Hart Merriam

Juneau

at Sitka is from a trifle below zero Fahrenheit to 90° above, and the monthly mean temperatures range from 31° to 56° only, illustrating the wonderfully uniform temperature of the Pacific coast. At Kadiak, 16 degrees farther west and a degree farther north, the mean temperature is 2° lower and the extreme range of temperature less. At Unalaska, 3 degrees south of Sitka, the mean temperature is only 36° and the range of temperature is still smaller.

While the mean annual temperature on this coast, whose latitude ranges from 54° to 60°, does not differ materially from that of Eastport, Maine, on the Atlantic coast, in latitude 45°, the summer temperature is much colder and the winter temperature much warmer. The statement has been made that it is no colder at Sitka than in Georgia. I believe this to be true in the sense that the minimum temperature is no lower; but it represents only a part of the facts, and much the less important part. It is also true that it is no warmer at Sitka than in Greenland or Labrador—that is, the maximum temperature is no greater; and for most economic purposes, except the making of ice, it is warmth, not cold, that concerns us.

The annual rainfall is heavy over this entire coast. At Sitka it is more than double that of the Atlantic coast, 105 inches a year being the record, and it diminishes but little westward. At Unalaska the record is 92 inches. Rain falls mainly in the autumn and winter, the summer being comparatively dry.

A description of climate would be in-

John Muir

complete if it did not include the amount of sunshine and cloudiness, since these are important factors in the growth of plant life. At Sitka it is cloudy two-thirds of the time, and nearly half of the time it is raining or snowing. At Kadiak the conditions are a little better; at Unalaska they are worse, for Unalaska is unrivaled for bad weather. Only 8 days in the year during several years of record were entirely clear and only 45 partly clear, the remaining 312 being cloudy, and 271 of those were rainy or snowy.

Before attempting to explain these peculiarities of climate, it should be stated that the sea commonly produces two modifications of temperature. It may reduce the extremes, making the atmosphere cooler in summer and warmer in winter, and it may reduce or increase the mean annual temperature. The Pacific coast of Alaska is within the range of the prevailing westerly winds of the northern hemisphere. These winds come off the ocean, bringing to the coast the temperature of the sea. As the sea absorbs heat slowly, in comparison with the land, and parts with it as slowly, the winds blowing off it are cool in summer and warm in winter. Moreover, since the ocean has waves, tides, and currents, by which its waters are moved about, the cold water of the north toward the south and the heated water of the tropics toward the north, there is a tendency to establish an equilibrium of temperature. Thus the northern seas are warmer, on the whole—that is, the mean annual temperature is higher—than land in the same latitudes, and through the agency of the westerly winds the coast shares in this amelioration of temperature.

These same westerly winds are responsible for another feature of the climate, the heavy rainfall. They come from the sea saturated with moisture, and if they find the land colder than they are, as it is in fall and winter, they are chilled below the point of saturation and disgorge copiously; but if they find

Photo by Curtis

An Indian Totem

Photo by C. Hart Merriam

Eskimo at Plover Bay, Siberia

the land warm, as it is in summer, they carry their moisture inland and the coast enjoys a comparatively dry season. This season is, however, dry only in comparison with the winter, the wet season. The rainfall of the three winter months at Sitka is commonly about 30 inches, while that of the three summer months is 16 inches, or more than half that of winter.

The fogs of this coast, really the most obtrusive feature of the climate, occur whenever the wind blows from the sea, which it does most of the time, even in summer. For obvious reasons they seldom or never occur with a land breeze.

The coast of Bering Sea has a climate widely different from that of the Pacific coast. The mean annual temperature is much lower, even after due allowance for the difference in latitude. At St. Michael it is 26°, and at Port Clarence, in Bering Strait, it is 20°. The range of temperature is much greater. The mean temperature of the coldest month at St. Michael is — 2°, of the warmest month 54°, showing a range of 56°. Similarly, at Port Clarence the coldest month is — 11°, the warmest 50°, a range of 61°. The highest temperature on record at St. Michael is 75°, the lowest — 55°, a range of 130°. The contrast with the Pacific coast is still greater in the matter of rainfall, which at St. Michael is very light, amounting to only 14 inches annually. Moreover, rain falls in the warm rather than in the cold season.

The temperature of this coast is not much modified by the sea. Bering Sea is practically a closed sea, the Aleutian Islands forming a partial barrier against the warmer waters of the Pacific; consequently its waters retain, to a large extent at least, the temperature incident to the latitude. Its mean annual temperature is little affected by outside influences, and the greater part of it is frozen for half the year. The extremes of temperature, however, are reduced by the slow absorption and radiation of heat, just as with the Pacific. As this region is north of the territory of the prevailing westerlies, the winds have no preva-

lent direction, but blow whithersoever they list. For the same reason the rainfall is light, and though the air over the sea is saturated with moisture, little of it drifts over the land to supply rain.

If there is a region more infested with fogs than the Pacific coast of Alaska it is Bering Sea. Here fog is the normal condition, and clear, bright weather the rare exception. It is no uncommon experience for vessels bound for the Pribilofs to miss the islands in the fog, and to spend days searching for them, as for needles in a haystack. They are a small target to shoot a vessel at from Unalaska, 250 miles away, and once missed, are easily lost in this great foggy waste.

The climate of the great interior region is that common to the interior of all continents. The mean annual temperature is practically the same as in the same latitude on the coast of Bering Sea, but the range of temperature is much greater. It is warmer in summer and colder in winter, since the land heats and cools much more rapidly than the sea. At the point where the international boundary crosses the Yukon River the mean temperature of the coldest month (in 1889) was —17°, that of the warmest month 60°, a range of 77°. Contrast these figures with those given above for Sitka, where the corresponding range was only 26°. Furthermore, consider that the mean temperature of the warmest month on the Yukon, in latitude 64° 41′, was 4° higher than at Sitka, over 500 miles farther south. These figures are instructive in pointing the conclusion that if any part of Alaska can become of agricultural importance it is the interior rather than the Pacific coast. But it is doubtful whether even this region will admit of profitable farming. In connection with this question the experience of the Canadians is instructive. On Peace River, in latitude 56°, 600 miles farther south, many and persistent attempts at farming have been made, but without financial success, although it is doubtless true that certain crops have been matured there.

The extreme range of temperature in the interior is surprising, even to those accustomed to roast by day and freeze by night in our western deserts. At this same point on the Yukon, tempertures of —60° and of 87° have been recorded—a range of 147°. Again con-

Eskimo at Plover Bay, Siberia

Photo by C. Hart Merriam

Mt. Paulof, Alaska Peninsula

trast this with Sitka, where 90° is the extreme range record.

The rainfall in the interior is light, ranging at various places and in different years from 10 to 25 inches. With the cold climate and consequent slight evaporation, it is probably sufficient in the majority of years for agricultural requirements. Differing radically from the coast climates, this climate is bright and sunny. There is little dull, cloudy weather and practically no fog. There is more sunshine here in a month than at Sitka in a year.

FORESTS

The coast, as far to the westward as Cook Inlet, is densely forested up to the timber line, which ranges with the latitude from 3,000 to 2,000 feet above sea-level. The timber is mainly, indeed almost entirely, Sitka spruce. There is some hemlock at higher levels, and in the southern part a little cedar also, but these are of little commercial importance. Red or Douglas fir, which forms the bulk and principal value of the forests of Washington, disappears in British Columbia. The spruce is large and fine, as judged by eastern standards, but as compared with the timber of Oregon and Washington, which is the standard on the Pacific coast, it is inferior, and little use is at present made of it, most of the timber needed being brought from Puget Sound. On Kadiak and the adjacent islands there is little timber, and farther west on the Alaska Peninsula and the Aleutian Islands none whatever, nor are there any trees on the islands in Bering Sea. Why the timber should thus suddenly disappear on the peninsula and islands is an open question. The rainfall is ample, and the climate little more severe than at Sitka and less severe than about Prince William Sound. The suggestion that high, cold winds prevent tree growth is negatived by the fact that such winds occur all along the coast, in forested as well as non-forested parts. Moreover, the forest-fire fiend has not been here.

The interior of the Territory is forested mainly with spruce, as far north as the valley of Koyukuk, and as far westward as the delta of the Yukon. In this enormous region there must be an almost fabulous amount of coniferous timber, sufficient to supply our country for half a century in case our other supplies become exhausted.

POPULATION

The population of Alaska in 1900, according to the Twelfth Census, was 63,592, having nearly doubled in the preceding ten years. Of the total increase, 31,540, about three-fourths was acquired by that portion of the Territory lying north of the Yukon River, and only one-fourth by that portion south of that river, including southeastern Alaska. Half of the increase in northern Alaska consisted of the people of Nome, which had a population of 12,486, by far the largest aggregation of people anywhere in the Territory; the remainder were scattered widely over its great area, but mainly in the valley of the Yukon and along the coast north of the mouth of that river.

In southern Alaska the population increased almost everywhere, but not by any means at as rapid a rate as in certain localities in northern Alaska. Skagway had a population of 3,117; Sitka, 1,396; Juneau, 1,864; Douglas, 825; Wrangell, 868, and the Indian village of Metlakahtla, 465.

Of this total population about 25,000, or a little more than two-fifths, were Indians, Eskimos, or mixed bloods, the remainder being whites. The increase during the past ten years probably consists entirely of whites.

The population is in high degree a floating one, with the slightest possible attachment to localities, and subsequent

censuses will doubtless show radical changes in its location.

RESOURCES

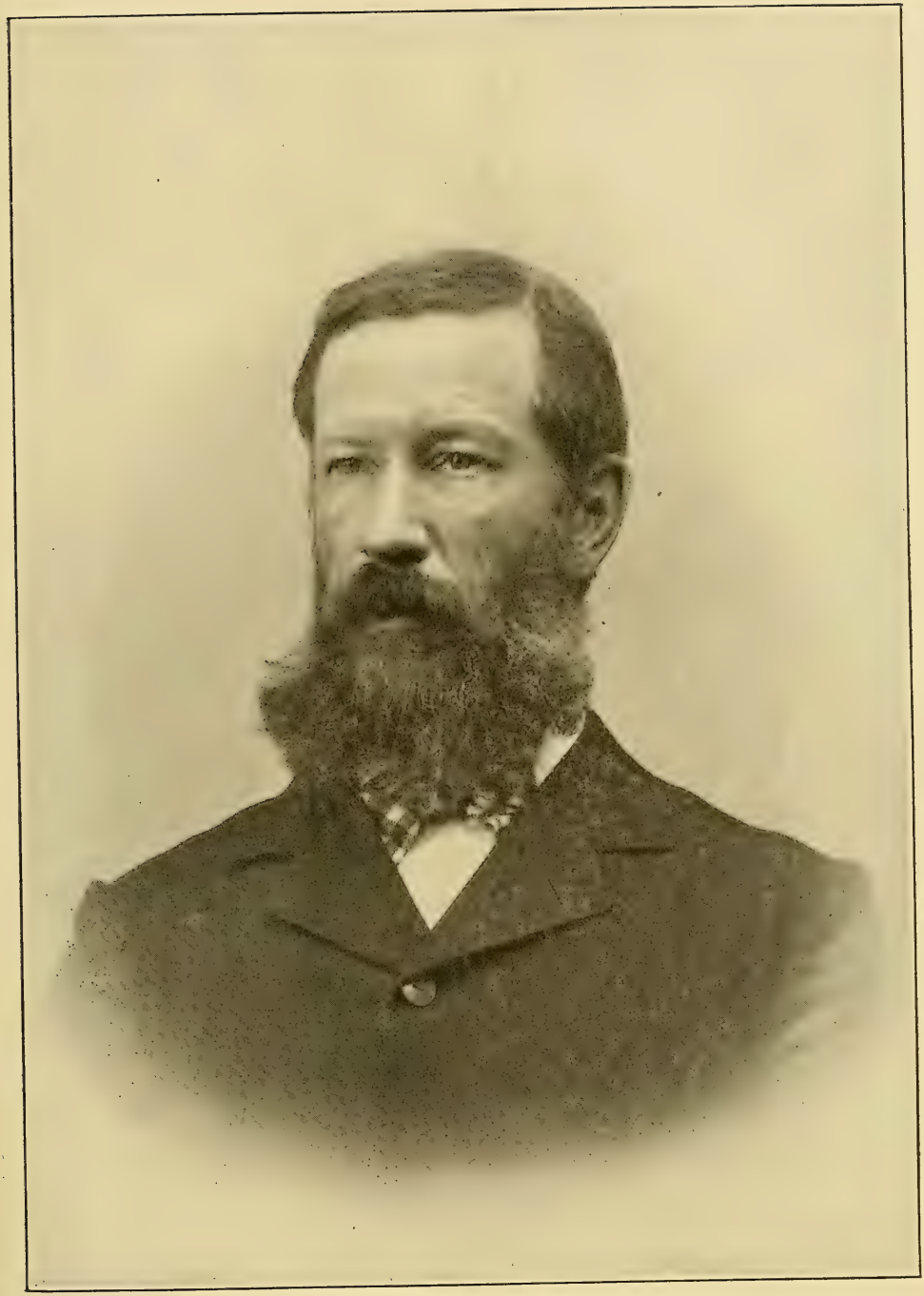
The natural resources of Alaska are enormous. The skins and furs, the fish, the gold, copper, and coal, and the timber of the Territory are in value almost beyond calculation, and the mere reaping of this harvest sown and ripened for us by nature will occupy an industrial army for many years. The wealth thus collected will add greatly to the well-being and happiness of our people.

Some of these natural resources, however, have begun to suffer from the drain to which they have been subjected. The gathering of furs and skins, which has been in progress since the early Russian occupancy of the Territory, has been prosecuted so actively that the fur trade is now of comparatively little consequence. Blue foxes are now so valuable that systematic attempts are being made to breed them for their skins. The sea otter has become very rare, and the value of skins correspondingly high. The fur-seals, on account of pelagic sealing, are now reduced to a small fraction of their former number, and only 24,000 skins were obtained at the seal islands in 1899. Even the great brown bear has become scarce and shy, and hides in the fastnesses of the interior, away from the seaboard, where he was formerly abundant.

The sea-birds, once plentiful all along the coast, are now driven to the rarely visited parts, where, particularly on the islands of Bering Sea, they may yet be found by millions.

Fish are still abundant, but with salmon canneries springing up all along the coast, it is probable that the demand will soon make perceptible inroads upon the supply. During the year 1899 these canneries packed and shipped 1,100,000 cases and 25,000 barrels of this fish.

The mineral resources of the Territory are yet in an undeveloped condition, but unless all signs fail, the chief wealth to be obtained from Alaska will be taken from the ground. Coal is known to exist in many localities, but is nowhere as yet mined on a commercial scale, owing mainly to its inferior quality; the coal in use at present is brought from Nanaimo or Puget Sound. Copper-vein deposits of great magnitude and richness have been found, notably on Copper River and the shores of Prince William Sound, but as yet none of them have been developed beyond the shipping of a few hundred tons of ore for testing. Gold deposits, both placer and vein, have been found in various places all over the Territory. They are so widely distributed and so rich as to lead to the conclusion that with more extended and thorough prospecting, the known auriferous areas will be vastly increased and the yield of the yellow metal multiplied many times. Some of the quartz mines, as the Treadwell, near Juneau, have been worked productively for many years. This mine alone has produced about $10,000,000. Others have recently become productive, and still others, more numerous, are yet in the development stage. The mines near Juneau produced in 1899 gold of the value of nearly two million dollars. At several localities in southeastern Alaska and on the Shumagin Islands quartz mines have been discovered, but at present placers are far more abundant. They have been found on many of the tributaries of the Yukon, especially on those from the south, the Sushitna, the Kuskokwim, and the Koyukuk, and in the north, the Ambler and the Noatak. At several places gold has been found in the beach sands on the seashore, and last, but by no means least, on the beach and the stream-beds at Cape Nome and Port Clarence. These last discoveries seem to be the greatest of the whole northwest, rivaling and probably exceeding the great Klondike dis-



Henry Gannett

covery, for many millions appear to be in sight awaiting the pan or rocker to separate the golden sand. The harvest of gold from Cape Nome during the summer of 1900 was $6,000,000 and the total product of the Territory from placers in 1899 was $1,200,000.

But after the enumeration of these latent resources of the Territory few are left to describe. Alaska is not a country for agriculture, nor for home-making. It has paid us its purchase price many times over, and in the future will pour much wealth into our laps, but it will never pay, as other accessions to our territory have paid, in making homes for our people. At present few people go to Alaska to live; they go there merely to stay until they have made their stake.

Farming as a business is impossible under the climatic conditions prevalent on the coast. It is granted at once that it is possible to mature certain hardy crops in favorable seasons, but this is quite a different thing from raising crops in competition with California and the Willamette Valley, even when the cost of freight is added. It must be done at a profit or not at all. It is of no avail to raise potatoes when they can be brought from Portland and sold for less than the cost of production in Alaska. If there is any part of the Territory in which farming can be successfully carried on, it is the interior, which has a much more favorable summer climate than the coast; but even there success would be doubtful. However, as the higher rate of freight to the interior will have the effect of a protective tariff on home products, it may be possible to raise grain and vegetables at a profit under conditions which would be prohibitory on the coast.

SCENERY

There is one other asset of the Territory not yet enumerated—imponderable and difficult to appraise, yet one of the chief assets of Alaska, if not the greatest. This is the scenery. There are glaciers, mountains, and fiords elsewhere, but nowhere else on earth is there such abundance and magnificence of mountain, fiord, and glacier scenery. For thousands of miles the coast is a continuous panorama. For the one Yosemite of California Alaska has hundreds. The mountains and glaciers of the Cascade Range are duplicated and a thousand-fold exceeded in Alaska. The Alaska coast is to become the show-place of the earth, and pilgrims, not only from the United States, but from far beyond the seas, will throng in endless procession to see it. Its grandeur is more valuable than the gold or the fish or the timber, for it will never be exhausted. This value, measured by direct returns in money received from tourists, will be enormous; measured by health and pleasure, it will be incalculable.

There is one word of advice and caution to be given those intending to visit Alaska for pleasure, for sight-seeing. If you are old, go by all means; but if you are young, stay away until you grow older. The scenery of Alaska is so much grander than anything else of the kind in the world that, once beheld, all other scenery becomes flat and insipid. It is not well to dull one's capacity for such enjoyment by seeing the finest first.

GEORGE M. DAWSON

IN the death of Dr. George M. Dawson the Dominion of Canada has sustained a great loss in the domains of geographic science and of affairs, for Dr. Dawson was not only one of her leading scientific men, but took an active part in her political matters.

Dawson was born at Pictou, Nova Scotia, in 1849, his father being the

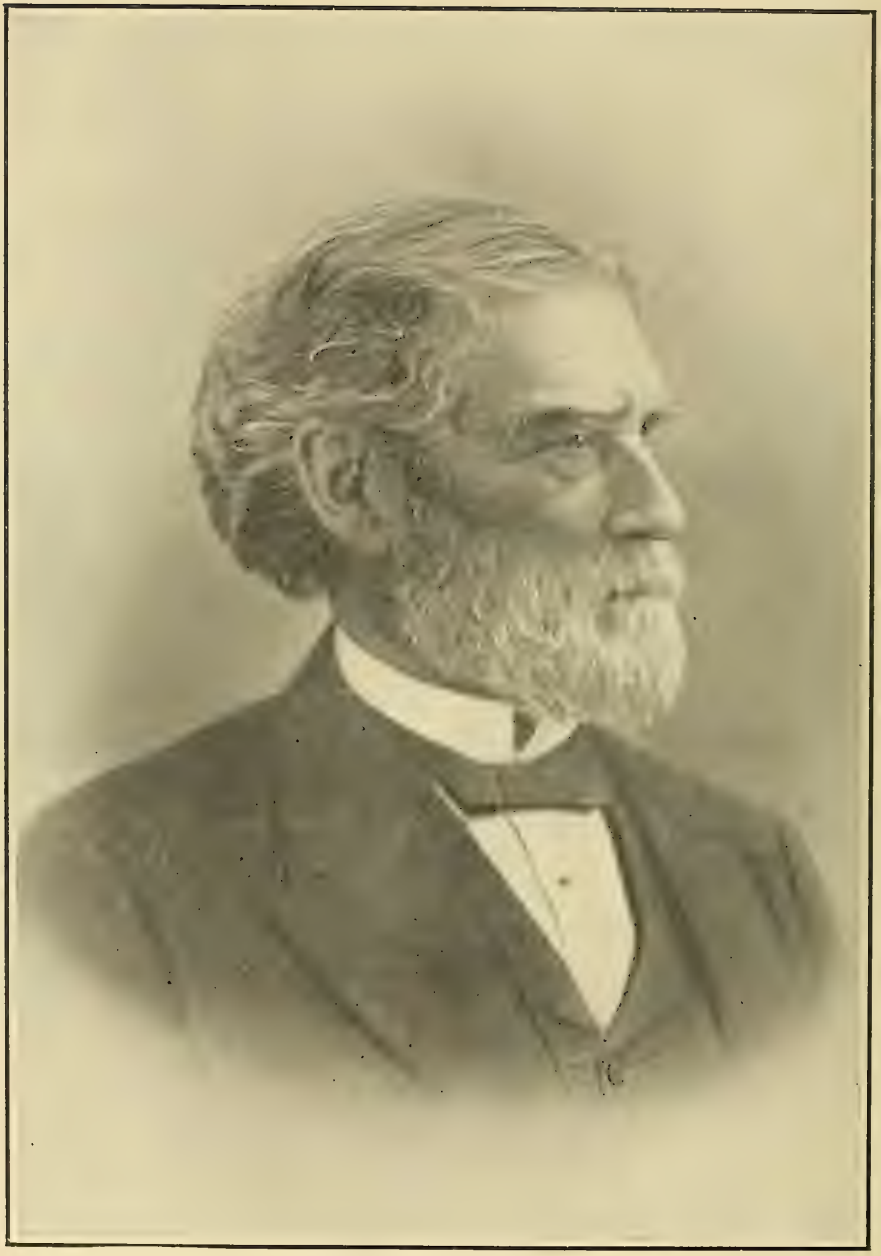
George M. Dawson

celebrated geologist, Sir William Dawson. After a thorough training at McGill University and at the Royal School of Mines of London, he commenced his long career of geographic and geologic explorations as geologist and botanist on the Northwest Boundary Commission in 1873. Two years later he joined the Geological Survey of Canada, and for nine years was engaged in the exploration of British Columbia, the Yukon Valley, and the high plains of the northwest. While his work was primarily geological, still we owe to him, more than to any other explorer, our present knowledge of the northwestern part of North America. In 1883 he was appointed assistant director of the Geological Survey, and in 1895 became its director, which position he held until his death, on March 2, 1901.

During his quarter century of active work many duties were imposed upon Mr. Dawson and many were the honors he received. In 1891 and 1892 he served on the Bering Sea Commission, and for his services received the order of Companion of St. Michael and St. George. In 1891 he received from the Royal Society of England, of which he was a fellow, the Bigsby medal for his researches in geology, and degrees were conferred upon him by Queens College and McGill University. In 1893 he was elected President of the Royal Society of Canada.

Dr. Dawson's work was mainly that of an explorer, and for that he had, in spite of his physical defect, wonderful ability and fitness. To draw broad and accurate generalizations from the slight data obtained by the explorer requires close observation, great breadth of vision, and high reasoning powers, and in the selection of Dawson for this work the Canadian authorities made no mistake. He has laid down with great accuracy the leading geographic and geologic features of the Canadian Northwest, and thus constructed a skeleton on which future work will supply the details.

H. G.



George Davidson

GEOGRAPHIC NOTES

ALASKA

THE narrative volume of the famous Harriman Alaska expedition of two summers ago will appear during the present month. Through the courtesy of Dr. C. Hart Merriam, editor of the volume and of the Harriman publications, the NATIONAL GEOGRAPHIC MAGAZINE is able to present in this number one chapter from this remarkable work—The General Geography of Alaska, by Mr. Henry Gannett.

So rapid has been the exploration of this vast territory during the past five years that few realize the extent of present knowledge of the country. Mr. Gannett, in his paper, gives the most comprehensive statement of the general geographic features as developed by recent exploration that has yet been published.

The narrative of the Harriman expedition is the most trustworthy and at the same time popular work on Alaska which has ever been offered to the public. Mr. John Burroughs opens with the story of the two months' travel of the Harriman party. Mr. John Muir follows with a chapter on the Glaciers. Then Mr. George Bird Grinnell describes the Natives of the Alaskan Continent—the Indians and Eskimo. Dr. Wm. H. Dall gives the History of the Discovery and Exploration of Alaska. Mr. Charles A. Keeler has a chapter on the Birds of Alaska, Mr. B. E. Fernow on the Forests, and then follows Mr. Gannett's article on the General Geography of Alaska. Dr. Merriam contributes the concluding chapter on the Volcanoes of the Aleutian Archipelago. The bird pictures by Mr. Louis Fuertes, the plant pictures by Mr. Walpole, and the fiord scenes by Mr. Dellenbaugh form a notable feature of the volume. Twenty colored plates, over 100 full-page photogravures, and 200 insets illustrate this splendid work. Messrs. Doubleday, Page & Co., of New York, are the publishers for Mr. Harriman.

ANDORRA AND SAN MARINO

THE two states which look strangest upon the map of Europe are the tiny Republics of Andorra, in the eastern Pyrenees, and of San Marino, in northeastern Italy. Each owed its original independence to its strong natural position; then for centuries the shrewdness of its inhabitants knew how to play off one enemy against another. In modern times its neighbors have seemed to feel a sort of chivalric sentiment for it because it has taken care of itself so long.

The Republic of Andorra has existed since the eighth century. When the Moslems invaded France from Spain in the eighth century that little territory in the mountains was not conquered by them and has remained independent ever since. It now enjoys the joint protection of France and of the Spanish Bishop of Urgel. Its extent is less than 175 square miles. Its hardly more than 6,000 inhabitants are almost all miners and farmers. It is governed by a representative council of 24 persons, who are chosen by the heads of families.

The Republic of San Marino, though having a population of about 10,000, is only one-fifth as large in area, but is still more ancient. In fact, it is the smallest and the oldest independent republic on the globe. It is governed by a Great Council of 60 members and a Minor Council of 12 members. It has an army of 938 men, and spends about $10,000 annually on internal improvements. On June 28, 1897, San Marino concluded a formal treaty of friendship with Italy.

GEOGRAPHIC NAMES

THE following decisions were made by the U. S. Board on Geographic Names, April 3, 1901:

Aowa; creek, Dixon County, Nebraska (not Aoway nor Ayoway).

Apple; group of islands in northern part of Sitka Sound, southeastern Alaska (not Iabloshni, Middle, nor Sredni).

Basket; bay indenting the southeastern shore of Chichagof Island, southeastern Alaska (not Kakagin nor Kook).

Bendel; island between Big Koniuji and Nagai Islands, Shumagin group, Alaska (not Morse).

Bois d'Arc; creek, Ellis County, Texas.

Bois d'Arc; creeks (two), Choctaw Nation, Indian Territory.

Bois d'Arc; post-office, Greene County, Missouri.

Bois d'Arc; river in northern Texas.

Bois d'Arc; township, Montgomery County, Illinois.

Broad; island near the junction of Hooniah Sound and Peril Strait, southeastern Alaska (not Crosswise nor Poperetchni).

Buncombe; creek, Chickasaw Nation, Indian Territory (not Boncombe).

Cacaway; island and point, Langford Bay, Kent County, Maryland (not Cacawa).

Camp Coogan; bay in eastern part of Sitka Sound, southeastern Alaska (not Camp Cogan, Camp Kogan, Kadiak, nor Nachlezmia).

Cliffs; point, Chester River, Kent County, Maryland (not Cliff City, Cliff's, nor Starts).

Comet; peak, Pinal County, Arizona (not Camels nor Comets).

Eyak; lake and native village at western edge of the Copper River delta, Alaska (not Eyack, Eyuk, Ighiak, Ikhiak, nor Odiak).

Fryingpan; cove, Eastern Neck Island, Kent County, Maryland (not Boxes nor Frying Pan).

Glenhaven; post-office, railroad station and township, Grant County, Wisconsin (not Glen Haven).

Hauani; creek, Chickasaw Nation, Indian Territory (not Haiyona nor Hiayona).

Hound; island in northern part of Keku Strait, southeastern Alaska (not Round).

Inner; point on the southeastern shore of Kruzof Island, Sitka Sound, southeastern Alaska (not Rocky nor Second).

Koip; peak and ridge on boundary between Mono and Tuolumne Counties, California (not Ko-it).

Leechville; post-office and village, Beaufort County, North Carolina (not Leachville).

Leevining; cañon, creek, and peak, Mono County, California (not Levining nor Vining).

Luppatatong; creek in Keyport, Monmouth County, New Jersey (not Lupatatong, Lupatcong, nor Luppatcong).

North Gabouri; creek, Ste. Genevieve County, Missouri (not North Gabor nor North Gabori).

Oraibi; post-office and village, Navajo County, Arizona (not Oraiba).

Piute; peak and post-office, Kern County, California (not Pah-ute, Pahute, nor Paiute).

Rockhall; district No. 5, Kent County, Maryland (not Edesville).

Shoshone;* river, tributary to the Big Horn River, Big Horn County, Wyoming (not Stinking Water).

*The legislature of the State of Wyoming passed an act, which was approved February 14, 1901, as follows:

"*Be it enacted by the legislature of the State of Wyoming:*

"SECTION 1. That the name of the stream of water known on the map of the United States as the Stinking Water River, situated in Big Horn County, Wyoming, and emptying into the Big Horn River, is hereby changed to the Shoshone River, and shall hereafter be designated and known as such.

"SEC. 2. This act shall take effect and be in force from and after its passage."

Scraggy; isletin Salisbury Sound, southeastern Alaska (not Samoilof).

Shoals; point, the southeastern point of Kruzof Island, Sitka Sound, southeastern Alaska (not First, Low, Nizmennia, Otmeloi, Outer Point of Shoals, nor White's).

Smoke; creek south of Buffalo, Erie County, Pa. (not Smokes).

South Gabouri; creek, Ste. Genevieve County, Missouri (not South Fork Gabor nor South Gabori).

Turner; island between Big Koniuji and Nagai Islands, Shumagin group, Alaska (not Stiernfeld).

Wapsipinicon; river in eastern Iowa (not Wabes-pinicon Wapsie nor Wapsiepinnecon).

West Point; city, militia district, and post-office, Troup County, Georgia (not Westpoint).

West Point; district, post-office, and town, King William County, Virginia (not Westpoint).

Wosnesenski; island off south shore of Alaska Peninsula and west of Unga Island, Shumagin group, Alaska (not Crested, Peregrebnoi, Unatkuyuk, Vozoychenski, Vossnesensky, nor Wossnessenski).

Yucaipe; creek and valley, San Bernardino County, California (not Yucaipa).

GERMANY IN CENTRAL AMERICA

THE rapid increase of German commercial interests in Central America has recently led Germany to appoint her first salaried consul to Central America. The consul has been accredited to Nicaragua, as the probable construction of the canal across the Isthmus will make it the most important of Central American countries.

The trade between Germany and Central America annually reaches from $7,140,000 to $11,900,000. German companies practically control the entire shipping of the coast, and $59,500,000 of German capital is invested there in real estate, industrial enterprises, and in banking houses. German farms and plantations cover more than 742,000 acres, on which are planted 20,000,000 coffee trees. Much of the trade of Central America goes abroad instead of coming to the United States, owing to the fact that American houses do not employ in their establishments persons speaking Spanish, and refuse to give credit.

A SUBMARINE ARCTIC BOAT

A UNIQUE submarine boat is now being built at Wilhelmshaven, Germany, designed not for war, but for the search for the North Pole. Herr Anschütz-Kämpfe, of Munich, the inventor, recently described his plans at a meeting of the Vienna Geographical Society.

The boat will be capable of descending to a depth of 160 feet, and of swimming at that distance from the surface, and can remain fifteen hours under water. The vessel is in the form of an ellipsoid of rotation, the major axis being 70 feet and the breadth 20 feet. Its cubical contents will allow sufficient air for five men for fifteen hours, the carbonic acid gas being removed by combination with caustic soda. The boat is kept from rising by vertical screws of five-horse power, and is propelled by horizontal screws of forty-horse power. A petroleum motor supplies the necessary power.

When ready for the start the boat will be towed to the edge of the ice near Spitzbergen, about 600 miles from the Pole. The inventor's argument for the rest of the journey is as follows: The polar ice, on the average, reaches to a depth of 16 to 20 feet, but when packed it may reach to a depth of 80 feet (land ice in the form of icebergs, which extend several hundred feet below water, may, he thinks, be disregarded in this

region). The extent of ice-fields rarely exceeds three miles, and as the vessel can make three miles an hour under water and can remain fifteen hours, he believes there will be no difficulty in swimming from opening to opening of the ice-fields. The possibility of meeting reefs of rock rising toward the surface or of sand banks he considers so slight as to be disregarded.

If after proceeding six hours under water the vessel finds no opening it will rise to the ice and search for a thin spot, and if blasting cannot effect an outlet there will be plenty of time to return to the last opening.

WORK IN THE ARCTICS IN 1901

NOT since the years of the Franklin search expeditions has there been such activity directed toward the north and south polar regions as during the present year. Not less than eight expeditions are now in the far north or are planning for active work in Greenland, Spitzbergen, and Franz Josef Land, and of these, five—Baldwin, Peary, Sverdrup, Bernier, and Anschütz-Kämpfe — are aiming for the North Pole.

Peary passed his third consecutive winter in the vicinity of Smith Sound, and is now probably sledding toward the Pole. In July the Peary Arctic Club of Brooklyn will dispatch for the third time a relief ship to carry him supplies and to bring him back if he this year reaches his goal. If unsuccessful he remains another year. Peary is not yet informed that the Duke of Abruzzi last year eclipsed Nansen's record. Mrs. Peary, with her little daughter, went north in the Peary relief ship of 1900, hoping to join her husband.

Sverdrup's plans for this summer are a mystery, as they were in 1900. He is probably pegging away in northeastern Greenland. He also has passed his third consecutive winter in the far north, but no vessel has taken him supplies in the meantime, and probably he will be obliged to return in September.

Baldwin inaugurates the most important arctic expedition of the year. The primary object of the *Baldwin-Zeigler* party is avowedly to get to the Pole. Scientific work is secondary, but the equipment of the party is so complete that much valuable data will undoubtedly be obtained. Prof. J. Howard Gore, the well-known physicist of Columbian University, accompanies Mr. Baldwin as far as Franz Josef Land, where he will spend the summer in work, and return on the second ship, the *Fridtjof*. The names of the scientific men who will remain permanently with the party have not yet been announced.

Mr. Baldwin intends to make some interesting experiments in the matter of food. He is taking a quantity of desiccated potatoes; also quantities of "fruit bricks," with which the Department of Agriculture has experimented so successfully. Bushels of strawberries, raspberries, etc., can thus be compressed into solid form and retain their freshness until used months later. Four hundred picked Siberian dogs will be taken, which is four times as many as the Duke of Abruzzi had with him and twelve times the number Nansen took. The bottoms of the kyaks and sled-runners, which were constructed in Norway, are lined with German silver, which Mr. Baldwin believes will afford the best protection against water and ice.

The *Amerika* and *Fridtjof* will steam north together as far as the ice permits, when the stores of the *Fridtjof* will be transferred to the *Amerika* and to a convenient point on Franz Josef Land, and the smaller ship returns to Tromsö.

A Russian Party, on a vessel of the type of the ice-breaking *Ermak*, will push northward as far as the powerful vessel can crush its way. A large staff of scientists will conduct observations during the trip, as the main purpose of the expedition is scientific. The *Ermak*,

with boilers under half pressure, can force her way through polar ice of 12 to 14 feet thickness at a rate of nearly 3 knots an hour. This type of vessel may prove an important factor in ultimately reaching the pole.

Captain Bernier, of Quebec, has adopted essentially the plan Nansen has urged of approaching the Pole from Bering Sea, between 165 and 170 degrees east longitude, and then drifting toward the Pole. Captain Bernier does not expect to set out this year, but is making arrangements for an expedition to start in 1902.

The widely circulated statement that the **Duke of Abruzzi** would send a special vessel northward in July to search for the three members of his party who were lost in Franz Josef Land in March, 1900, is unfounded. The whaling steamer *Capella*, which every summer goes northward, toward the end of July will stop incidentally at Franz Josef Land to see if it can find traces of the missing men, but the Italian prince has no connection with the plan.

Walter Wellman has purchased a whaling steamer in which he hopes soon to lead a third arctic expedition. The party may start this year or wait till the summer of 1902.

The project of **Herr Anschutz-Kampfe** of attaining the North Pole by means of a submarine boat has been alluded to on page 201.

WORK IN THE ANTARCTICS

PLANS are under way for five expeditions to southern regions, two of which—the English and the German—set out in July, in costly ships specially constructed for the purpose.

The *Discovery*, the first ship ever constructed in England for purely exploratory work, was recently launched on the Firth of Tay. The *Discovery*, which is the vessel of the **English Antarctic Expedition,** is the sixth of her name in the annals of British exploration. The first *Discovery* carried Hudson to Hudson Bay in 1610, on the ill-fated voyage when his crew mutinied and abandoned him in a tiny boat to perish on the great bay which he had discovered. The second of the name one hundred years later made a voyage to Hudson Bay. The third was the second ship in Cook's third voyage, in which he discovered the Hawaiian Islands, only to be murdered there a few months later. In the fourth Vancouver explored the Gulf of Georgia and the shores of the island which bears his name—1791–'95, and the fifth was the second ship of the Arctic expedition of Sir George Nares.

The present *Discovery* is as staunchly built as experience and science can make her. She is a combined sailing and steam vessel, with engines of 450-horse power, and will be able to steam about eight knots an hour. At the water line she is 170 feet in length, with an extreme breadth of 33 feet; her mean draft is 16 feet and her displacement 1,750 tons.

Captain Scott will have under him four other officers, two of them belonging to the navy and two to the Royal Naval Reserve. The second in command will be Lieutenant Armitage, whose three years' experience in Franz Josef Land with Jackson should be of immense service, especially if he is placed in command of a land party. There will be three civilian scientific specialists and two medical officers, both of them qualified to undertake certain departments of scientific work. The petty officers and crew will number about 25, so that the complete complement of the *Discovery* is not likely to exceed 40. There will be some 20 sledges and 20 dogs, some of the sledges being light enough to be easily drawn by men.

The *Gauss*, for the **German Antarctic Expedition** (named after the Göttingen professor who did so much to stimulate

Antarctic research), was launched at Kiel early in April. The German ship, like the *Discovery*, is built mainly of wood, the only material which is elastic and strong enough to resist ice pressure and the boisterous seas of the south polar regions. She is some twenty feet shorter than the English vessel, but is broader, and her displacement is 300 tons less. The crew will consist, in addition to Dr. von Drygalski, of four scientific assistants, a captain, a first officer, two mates, an engineer, ten seamen, six assistant engineers and stokers, a cook, and a steward—28 in all. Each of the officers has a cabin to himself, while the crew have four large rooms. All the dwelling-rooms will be heated by steam, and it is calculated that a temperature of 50° Fahr. will be maintained within when that outside is as low as — 22°. Electric light will be provided throughout practically the whole ship, and an acetylene apparatus may possibly also be installed. Laboratories and other special arrangements are provided for scientific work, while, as in the British ship, dredging and sounding apparatus have been provided. Dr. von Drygalski is planning to take 50 dogs. He, as well as the English captain, has included a balloon in the equipment.

A map showing the routes of the English and German expeditions was published in this Magazine, in No. 8, vol. x. The English expect to establish a station on Cape Adare, Victoria Land, which will be the base of their land parties, while the Germans plan to make their base on some point in Wilkes Land. Each vessel will carry sufficient stores for 3 years, as it is probable that each party will remain that time within the Antarctic Circle.

The Swedish Antarctic Expedition, under Dr. Otto Nordenskjold, has engaged the *Antarctic*, the vessel with which Dr. Nathorst made his notable explorations on the east coast of Greenland in 1899. This party may possibly leave in September, but the chances are that they will not set out until 1902.

Plans for the **Scottish Antarctic Expedition** are progressing. This expedition will probably not set out until the year 1902.

The **Duke of Abruzzi** is organizing a south polar expedition to start in June, 1902. He is enthusiastically supported by all Italians.

AN AMERICAN FLOATING EXPOSITION

THE suggestion for a floating exposition made by the Chief of the Bureau of Statistics of the Treasury Department in the February number of this magazine has aroused much discussion not only throughout the United States, but in other parts of the world. Mr. Austin has received letters from various countries in Europe asking about the proposed enterprise, and many inquiries from manufacturers and merchants in the United States desiring to participate in an undertaking of this character.

This suggestion of Mr. Austin has been followed by the announcement that a floating exhibition, to visit the cities bordering upon the Gulf of Mexico and Caribbean Sea, has been organized at Buffalo, and will leave in the autumn of the present year for that field. A number of other enterprises of this character have also been suggested.

The Bureau of Statistics has received the following statement, published in the *Moniteur Officiel du Commerce* (Paris, March 28, 1900), regarding a floating exposition recently organized in Hamburg, Germany:

"The earliest exhibition of this kind was organized about two years ago, and it must be said that the results of the enterprise were in excess of the most sanguine expectations: Total value of transactions, 22,000,000 marks ($5,236,000), at a cost of about 800,000 marks, or about $190,400. The details of opera-

tion are stated by the correspondent as follows:

"'The syndicate addresses to manufacturing and commercial firms circulars explaining the purpose of the exhibition and the terms of participation. As soon as the number of would-be participants is large enough to permit the loading of a vessel, the exhibitors send their samples to the port of departure. These samples are then mounted and exhibited on board the vessel, especially fitted for this purpose.

"'By each exhibit there is an advertisement giving prices and terms of sale. Sales agents representing either the syndicate or the individual exhibitors furnish all desired information to the visitors at the various ports where the vessel stops. These sales agents are chosen from among the young men, as well as the young women, graduated from commercial schools and speaking at least two languages. Interpreters are hired on the spot in each country of a new language. The sales agents, besides seeing visitors aboard the ship, visit also with their samples the towns in the interior of the country. In such manner the cost of transportation is greatly reduced.

"'The exhibitors pay to the syndicate a commission, to be deducted from the realized sales and in proportion to the value of the product. In addition to this commission, the participants pay a proportionate share of the cost of chartering and loading the vessel and the general expenditure of the undertaking, such as the hire of clerks, interpreters, etc.'

"The report concludes with the expression of the hope that French commercial circles would appreciate this novel idea and try to achieve even more splendid results."

Announcement of an Austro-Hungarian floating exposition to leave Trieste this month for a voyage around the world was made in the preceding number of this Magazine.

POPULATIONS OF AUSTRIA-HUNGARY, DENMARK, AND SWITZERLAND

THE figures for the census of Austria-Hungary, taken in December, 1900, show an increase for the past ten years of about 10 per cent, a more rapid growth than the dual kingdom has experienced for several decades. The population is about 46,890,000, which makes her the seventh country in the world in population. Those outnumbering her are China, the British Empire, the Russian Empire, the United States, France, and the German Empire. Japan has a million or two less.

The Danish census was taken February, 1901, and shows an increase during the last eleven years of 12½ per cent, which is greater than in any recent decade. This increase is mainly due to the diminishing number of emigrants and to the decrease in the death rate, brought about by the efforts of the government to prevent the spread of consumption. As in the other countries of Europe, the people are moving into the towns. The towns show an increase of 28 per cent, while the country districts show an increase of only 4 per cent. The present population of Denmark is 2,447,441.

The census of Switzerland, taken December 1, 1900, gives the population of the republic as 3,312,551, an increase of 13.5 per cent during the twelve years since the preceding enumeration.

THE CONQUEST OF CHINA

"I KNOW not in what fable I have read about some fishermen who had disembarked upon an unknown island and had already begun to set up their tents and to sow their grain, feeling great pride in their unexpected acquisition, when, all at once, they found themselves hurled into the water—they and their implements—so that the greater

part of them were drowned. They had set foot upon a huge slumbering whale, which had subsequently waked up when the first incursions had been made on his body by the newly arrived occupants.

"This is a fable, but I fear it may become history when it is applied to the mistaken calculations of the European powers as to the occupation of China."

Thus Cesare Lombroso in a recent contribution to *The Evening Star* (Washington, D. C.) describes the Chinese problem. He believes that the Chinese are a different, not an inferior, race; that they are now lazily dormant, but will soon be exasperated by European oppression and excited to fearful rebellion that will wreck everything foreign in the empire. He agrees with M. De Bloche, the famous Russian advocate of international arbitration and the inspirer of the Peace Conference, that there is a still greater peril, namely, that when the Chinese have been badgered and harassed beyond even Chinese patience, as a last resource they will throw themselves into the arms of Japan. Such an alliance would menace the rest of the world, for Japan loves Europeans only so long as she can learn from them.

The Manchurian Railway the Russian Government hopes to complete during the current month, states the American consul at Moscow. Working trains are already running between Onon, Harbin, Vladivostok, and Port Arthur. Thus in a few weeks trains will run from St. Petersburg to Port Arthur with only one small break—the few miles around Lake Baikal, where heavy boats ferry the cars across the lake. A map showing the route of the Manchurian Railway was published in No. 8, vol. xi of this Magazine.

The Survey of Greece, which has been interrupted since the Greco-Turkish war, is to be resumed this spring under the direction of Heinrich Harti, a professor at the Vienna University. Professor Harti was summoned to Athens last autumn to inspect and take charge of the topographical bureau which he founded some years ago. It is feared that the cadastral survey by communities which has been ordered will not be successful, as the people object to the demarkation of boundaries. Professor Harti, however, hopes to be able to make a general survey of sufficient accuracy to make a map of the whole kingdom on a uniform system.

Explorations in Alaska. — The U. S. Geological Survey will send this summer three important expeditions for exploratory work in Alaska. The first, under W. J. Peters, will start from Bergman, nearly 1,000 miles northwest of Sitka, and proceed to the Arctic Ocean. The party hopes to advance eastward as far as the British boundary, and then will turn westward again and proceed toward Point Barrow. The second party, led by W. C. Mendenhall, the geologist, will work around Kotzebue Sound. The third party, led by Mr. Gerdine, will continue previous explorations in the region of the Copper River.

The War Department sends no expedition to Alaska, as its resources are fully occupied by Cuba, Porto Rico, and the Philippines.

The Biological Survey of the Department of Agriculture will send this summer parties to the region of Athabasca Lake and the Great Slave Lake to determine the zones of distribution of the fauna of that country. Mr. Preble, who so successfully led the party from the Survey to the Hudson Bay country last year, has charge of the work. Dr. C. Hart Merriam, the chief of the Survey, continues his study of the zones of distribution of the fauna of California.

The new director of the Geological Survey of Canada is Dr. Robert Bell,

formerly the senior member of the staff of the Survey. Dr. Bell, since he joined the Survey, in 1857, has made surveys, both topographical and geological, in almost every section of Canada.

Three expert geologists of the U. S. Geological Survey are now engaged in making an examination into the mineral resources of Cuba. The work is very important, and may result in much economic value to the island. It was undertaken at the suggestion of Governor-General Wood, and all of the expenses will be met by the Cuban government.

The U. S. Coast and Geodetic Survey has five parties in Porto Rico charting the coast of the island. This work has now been in progress for two years, and great advance has been made in obtaining accurate charts of the coastline. Several local harbor charts of the Hawaiian Islands are being published by the Survey, the result of surveys made in 1899 and 1900.

GEOGRAPHIC LITERATURE

Where Black Rules White: A Journey Across and About Haiti. By Hesketh Prichard. Illustrated. 8vo, pp. [i–xi +] 1–288. New York: Chas. Scribner's Sons, 1900.

Made attractive by a tasty symbolic binding, clear type, thick and large paper, fair half-tone reproductions of photographs, and excellent press-work, this book is a convenient outline of its writer's knowledge concerning one of the most interesting portions of the western hemisphere—the only considerable portion which has ever reverted from Caucasian rule to the dominion of an alien race. The fifteen brief chapters are based mainly on the observations of a single visit; although interesting historical details are interwoven here and there, there is nothing in profession or performance to indicate that the author was inspired by the instincts of the historian, and much to indicate that he was not geographer or geologist, naturalist or artist, ethnologist or sociologist, economist, or even serious student—but just a tourist bent on writing a book. So the chapters are light if not frothy, the expressions youthful if not flippant; yet the vocabulary is remarkably rich and the word-painting singularly vivid, and the narrative smacks of the soil throughout. The author pays tribute to Toussaint L'Ouverture as the one noble figure in Haytian history, but shows that the bloodthirsty Dessalines is the local hero; he summarizes the history of black rule as one of steady lapse from civilization to barbarism if not to savagery, and is correspondingly pessimistic as to the future of the island; he ascribes the progressive degradation partly to the incompetence of the masses, partly to the corruption of the classes, but mainly to the persistence of the Vaudoux cult with its depressing beliefs and ghastly ceremonies running down to serpent-worship and human sacrifice. The book is material for knowledge of Haiti—material rather meager and tenuous, perhaps, but direct, useful, and happily dressed. W J M.

China. By James Harrison Wilson. Third edition. With map. 8vo, pp. xxxvii + 1–422. New York: D. Appleton & Co. 1901.

For many years General Wilson's work on China has been a standard authority. The third edition includes an account of the Boxer War and of the diplomatic conferences of last fall.

General Wilson believes that Japan will be forced to follow the lead of the three great European powers—France, Germany, and Russia—in all Chinese questions. Russia occupies an impregnable position, and will dictate her policy to France, and thus indirectly to Germany. A few hundred years from now, General Wilson believes that "universal empire will have its nucleus and seat" in China, as her "coal measures and iron deposits are commonly believed to be the most extensive and the most enduring in the world." That it will be an empire of white men and not of yellow men is the author's unhesitating conviction.

The Land of the Moors. By Budgett Meakin. Illustrated. 8vo, pp. 464. New York: The Macmillan Co., 1901.

Mr. Meakin was for some years editor of the *Morocco Times*, and is the author of a number of reliable books relating to the Moorish Empire—"The Moors," "The Moorish Empire," etc. The present volume deals more especially with the geographic features and the history of the exploration of Morocco. There are good chapters on the Physical Features, Mineral Resources, Vegetable Products, and Animal Life. The book is timely, as "the land of the Moors" will probably be the center of much diplomatic warfare during the next decade. The apparent alliance between Italy and France undoubtedly has some bearing upon the ultimate fate of the country. The author believes that "France is the normal heir to Morocco whenever the present empire breaks up," and thinks that England should make up her mind to the inevitable fact.

PROCEEDINGS OF THE NATIONAL GEOGRAPHIC SOCIETY

Meetings.

April 12, 1901.—The annual reception of the Society was held in the parlors of the Arlington Hotel. Mr. Paul Du Chaillu was the guest of honor of the Society, and gave some interesting reminiscences of his life. The official, diplomatic, and social life of the Capital were the guests of the Society during the evening.

April 19, 1901.—President Graham Bell in the chair. The new by-laws for the Society, submitted and recommended by the Board of Managers, after a full discussion were unanimously adopted. The by-laws and the reasons for their adoption were published at length in the April number of this Magazine (pp. 167–'8).

Announcements.

The President announced at the meeting April 19 that the plans for the building which is to be the headquarters of the Society are advancing, and that it is hoped in a few weeks active work will be commenced.

THE ANNUAL EXCURSION AND FIELD MEETING of the Society will be held at Brandywine, Del., Saturday, May 18.

As the fiscal year of the Society will hereafter begin the first of January instead of the first of June, the Board of Managers have voted to fix the dues of members for the seven months which intervene between the end of the present fiscal year, May 31, 1901, and the beginning of the next fiscal year, January 1, 1902, at $1.

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CONTENTS

CHINA: HER HISTORY AND DEVELOPMENT. BY JOHN BARRETT, FORMERLY MINISTER TO SIAM . . . . . PAGE 209

THE DIKES OF HOLLAND. BY GERARD H. MATTHES, U. S. GEOLOGICAL SURVEY. ILLUSTRATED 219

MEXICO OF TODAY. BY SENOR DR. DON JUAN N. NAVARRO, CONSUL-GENERAL OF MEXICO IN NEW YORK CITY . . 235

SIR JOHN MURRAY. ILLUSTRATED 238

GEOGRAPHIC NOTES 240

GEOGRAPHIC LITERATURE 248

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THE POPULAR SCIENCE MONTHLY for June opens with an article by Prof. J. W. Tuomey, of the newly established Yale Forest School, on the forest reservations of the United States. The importance of these great reservations for the future of the country is scarcely appreciated, and this article, with its beautiful illustrations, will call attention to these national parks, whose area is more than fifteen times the State of Connecticut. Another elaborately illustrated article in the number is one by Professor Francis H. Herrick, of Adelbert College, describing his newly discovered method of photographing and studying birds at arm's length. Dr. David Starr Jordan, President of Stanford University, contributes a study of the decay of races through the survival of the unfit, arguing that war weakens the nation by destroying its best material. Professor Robert H. Thurston, Director of Sibley College, Cornell University, traces the progress and tendency of mechanical engineering during the nineteenth century. Professor James Lewis Howe, of Washington and Lee University, contributes an article on the periodic law, a scientific generalization, the importance of whcih is ranked with the law of gravitation or the theory of evolution, yet regarding which many intelligent people are not informed. Mr. Havelock Ellis continues his study of British men of genius, tracing their marriage and family and the age to which they lived. An address by the late Professor Henry A. Rowland, of the Johns Hopkins University, entitled "A Plea for Pure Science," points out the defects and needs of science in America. Dr. Gary N. Calkins, of Columbia University, describes the malaria-bearing parasite by means of which the mosquito spreads this disease, the most important scientific advance since the discovery of the Röntgen Rays. The number, as usual, closes with short notes describing the most recent progress of science.

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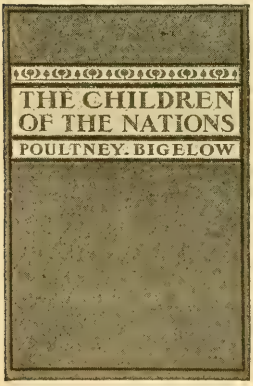

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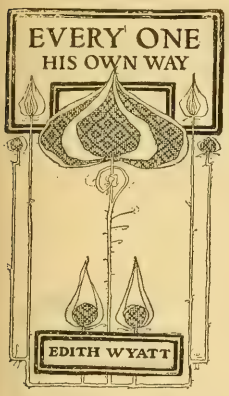

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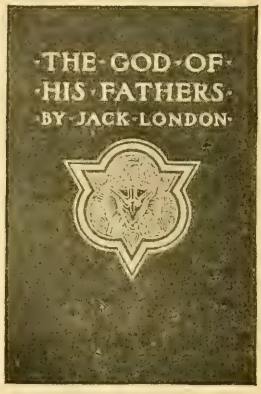

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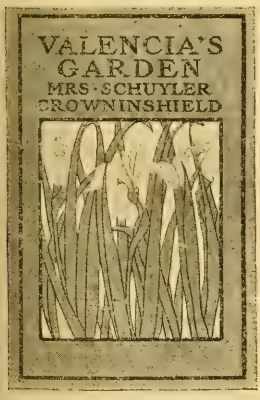

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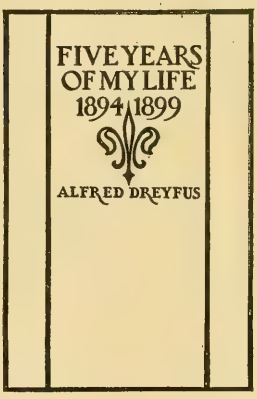

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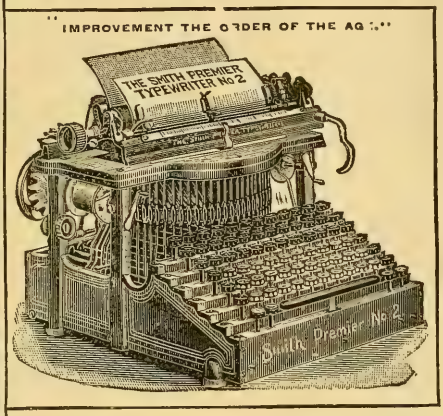

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THE NATIONAL GEOGRAPHIC MAGAZINE

CHINA: HER HISTORY AND DEVELOPMENT

BY JOHN BARRETT, FORMERLY MINISTER TO SIAM

MYTHOLOGY plays an important part in the ancient history of China, as it does in that of the older European nations. Going back to the fabulous times of 500,000 to 1,000,000 years, it first begins to tell a story of some truth about thirty-three centuries before Christ. Fuh-hi, who reigned 2900 B. C., is commonly regarded as the first real man whose name stands out in the long dim line of ancient kings. Before him as a human monarch were ages of supernatural giants. There was Pwan-ku, who formed cosmos from chaos. For 18,000 years he labored chiseling into definite form the rude, shapeless earth. He was followed by three sovereigns who, during another period of one hundred and eighty centuries, prepared the earth for ordinary life. Under the suggestive and appropriate names of the Celestial, Terrestrial, and Human, their deeds are sung in Chinese legends. In these tales we are told how they evolved the relations of the sexes, government, and order, and taught men to eat, drink, and sleep. They enticed fire from heaven, and with it cooked the raw food of the soil for the better support of their protégés who were populating the valleys and plains and mountains they had created. There are no more interesting myths in the poetry and song of the ancient Greeks and Romans than can be found in the fanciful narratives of the Chinese romancers; and, if we investigate carefully the relations of China in the remote past to western Asia, we may be even convinced that the legendary lore of the former antedates the latter in its inspiration and first rehearsal to charmed and credulous ears.

EIGHT GREAT EMPERORS

Fuh-hi, the first landmark of history, and his seven successors held sway for nearly eight hundred years, an average of a century each. The atmosphere of myth still remains here, unless in the repeated songs of their achievements some lesser lights of their dynasty are forgotten. From the number stands out Hwangti, "the founder of China," as he is often portrayed, although the same

honor is given to many others and claimed by more. Hwangti's capital was in Honan, and he is described as extending the empire from Pechili to the Yangtze, while his son even extended the boundaries into Manchuria on the north and Tonkin on the south.

He is given the credit of originating the famous "Cycle of Cathay," the arbitrary period of sixty years, in honor of the sixty-first year of his reign; and he established a regular calendar. But a greater deed was the regulation of weights and measures according to the decimal system. He carried the same principle into the government of his kingdom, making ten towns one district, ten districts one department, ten departments one province, and ten provinces one empire. He built highways upon land, and boats to navigate the rivers, and generally was a wise and progressive monarch.

He was following in the footsteps of Fuh-hi, who instituted the laws of marriage and methods of agriculture and fishing.

The lyre and lute were invented by him to make his people cheerful and content. Chinese characters were devised and family names were then first known.

While all these stories of providing the necessities and of adapting the realities of life suggest a degree of truth, there is woven in with them a large measure of romance that colors their historical value. Fuh-hi attributed all his successes and glorious achievements to the dragon-horse that came out of the Yellow River bearing a scroll on its back, and possibly in this fable we have the crystallization in legendary history of the dragon conception, which plays so important a part in contemporary Chinese romance and reality — which adorns their flags and clothing, is the central figure of their art, and is remembered in their prayers.

But the glory of Fuh-hi and Hwangti is overshadowed by the renown of that galaxy of Chinese heroes, the Emperors Yao, Shun, and Yu, whom Confucius and Mencius, China's two greatest sages, have made immortal. Yao and Shun reigned approximately B. C. 2350–2200, and their names and deeds are known to every Chinese boy and girl. The child of mandarin or coolie will glibly describe their greatness, as the son of millionaire or pauper in America will tell you about Washington or Lincoln.

It is well to note in this connection that the characters which are admired and remembered in China today as in the past are generally men of highest attainments and lofty motives. The sterner records of history tell of evil as well as good men, but the popular narratives, songs, and poems, together with the deep philosophic works of China's wise men, give little consideration to other than the great and good. Thus has there been a continuous and notable influence for the development and betterment of the Chinese peoples from the earliest times, which has had a marked effect upon the life of the empire through its ups and downs of the past centuries. It elevates the Chinese far above and beyond any position as barbarians. It demonstrates the existence of a powerful civilization more years before the birth of Jesus of Nazareth than have elapsed since that chief event in all history startled and amazed the pagan world.

After Yao and Shun came the mighty Yu, during whose reign were two events that will never allow it to sink into entire oblivion. The first was the terrible inundation of the greater part of the then inhabited empire by China's sorrow, the Yellow River. The second was the discovery of the manufacture of wine. Which has been the worst for mankind might be difficult to determine! Yu, after he had enjoyed his first experience with the beverage, sagely remarked, "The days will come when

some of my successors, through drinking this, will cause infinite sorrow to the nation." Yu was the founder of the Hia or Hai dynasty, which controlled China from 2200 to 1818 B. C.

The records of Chinese historians are not definite in naming the year when the Chinese settlers first arrived in their new home, but it was in these early semi-legendary years. By some the time is placed before the days of Fuh-hi or as contemporaneous with his reign. Others contend that they came about 2500 B. C., antedating the reign of Yu; but nearly all agree that the Chinese were not natives. They came, if we are to take the word of Confucius, from the valley of the Euphrates or from the regions of the Caspian Sea. Journeying for a new land and home, they persisted in their eastern pilgrimage by a northern route and entered China through the valley of the Hoangho or Yellow River, until finally they were stopped by the boundless waters of the Pacific.

The fact that the Chinese were not indigenous adds vastly to interest in the study of the growth of the empire. It establishes a degree of sympathy on our part with their history that we might not otherwise feel. The present dominant American race were not aborigines; we drove the latter unmercifully before us and ruthlessly took possession of this continent. So the Chinese, entering their new field of effort, gradually drove before them the natives until now there are left only small numbers of the aborigines, who have their home and rendezvous in the fastnesses of the southern mountains. The Chinese seem to have begun their empire with isolated bands of colonists in the northern, central, and western provinces of Shensi, Shansi, Honan, and Hupeh, just as the first Europeans established themselves in Massachusetts, Virginia, and Florida. Now they reach over an area larger than that which is under the sovereignty of the American people.

The mighty Hia dynasty was doomed to end through the very means that Yu predicted. It went out in debauchery and unbridled voluptuousness, under the lead of vain Kieh-Kwei, and of his beautiful but wanton consort, Meihi.

The dynasty of Shang then assumed power, and 28 sovereigns occupied the throne through 644 years. These kings were good and bad, strong and weak, and the empire prospered and suffered, extended and contracted, according to the character and power of these men. If we will pause and think what a period of 644 years and 28 monarchs means, and yet what little impression they made on history beyond a passing record of the usual wars, cabals, and strifes, we are in a mood to appreciate how trifling a portion of history's long story the present exciting times may occupy in the minds of the future historians.

Recuperative Character of Chinese

Let us remember, however, one consideration that augurs well for China in the future, as it has figured conspicuously to her advantage and in her growth during both the clear and the misty centuries of time that is gone: the end of the majority of the dynasties has come under the reign of evil or weak minded men and women, when it deserved to end and when it was best for the people and kingdom that a change should be inaugurated, and with few exceptions the succeeding monarchs have been men of eminent ability and leadership. This recuperative feature of China—of her dynasties, kings, and people—which has been illustrated repeatedly through fifty centuries or seventy-five cycles, may prove her salvation in the present crisis. No other nation in the history of the world has successfully mastered the events of centuries like China. If the principle of the survival of the fittest is demonstrated as logical and true in the

unlimited past competition of peoples and governments, and has kept China in the front as an independent power, will not its application in the future be attested by a newer and greater China rising out of the trials and confusion of the hour? With such an evolution of events, the policy of our Government of friendly assistance to China would seem all the more wise, and fraught with favorable results alike to Cathay and America.

THE GOLDEN AGE IN CHINA'S ANCIENT HISTORY

Out of the darkness shall come light. From the haze of the Shang dynasty was born the incomparable Chow dynasty, which boasted of thirty-five rulers and lasted through nine eventful centuries, from B. C. 1122 to 255. This period was a golden age in China's ancient history. It was the bridge between the doubtful past and the actual present. But its crowning glory was the appearance of Confucius and Mencius upon the stage of the world's history; nor should Laotze, the founder of Taoism, be omitted. He figured in the same dynasty, but his work was not so much for the bettering of his fellow-men as were the teachings and example of Confucius.

When we discuss at the dinner table, in lecture-rooms, and in social and literary intercourse the golden ages of Greece and Rome we are prone to forget entirely that in China there was a corresponding age, when real civilization in its broad sense reached a mark as high even as it did in southern Europe. It began in strength, blazed into unparalleled brilliancy, and then sank into decadence, to be followed by a period when the dregs of misfortune were drunk by the people; and such was the record also of European and western Asiatic powers.

If the founder of the Chow dynasty, Wu Wang, were alive today he would be the man of power, ability, and leadership to save China. He found the empire in a more deplorable state than Kwangsu, the present ruler, when he ascended the throne. He made it respected throughout Asia. Embassies came with tribute from Korea on the north, Cambodia and Siam on the south, and Tatary and Tibet on the north and west. But in his power he made one cardinal error: he established the system of feudal states and feudal lords. Their struggles and wars were the influences which eventually wrought the downfall of his dynasty.

Singular enough, great national progress was made during these times of strife, and the boundaries of the empire were enlarged in proportion to the internal wars. The foundation was laid for the greater China that was to follow.

If nothing stood to the credit of the Chow dynasty other than the life of Confucius, it would have honor enough, without even including Mencius and Laotze.

CONFUCIUS AND HIS PRECEPTS

Confucius was born 551 years, or nearly six centuries, before Christ. Beyond a few myths and legends connected with his birth, there is nothing fabulous about his life. He stands out clearly as one of the greatest men that the world has ever produced. He was a man, not a saint; a man who went through the average experiences of a scholar and statesman in public life, and who in an unpretentious but sincere way endeavored to better his fellow-men. He gradually rose from low estate to be a magistrate, and finally became the prime minister of Duke Ting. He was an eminent lawyer, not unlike Moses or Solon, and was a practical philosopher like Benjamin Franklin. He was a man of the people and knew their impulses, hopes, and wishes like Abraham

Lincoln. It was because he understood man's nature that he was able to make such a lasting impression. The masses of China study his precepts today as they did twenty centuries ago and will twenty centuries hence.

Confucianism has its failings and weak points when regarded as a religion and must in the evolution of time give way as a religion to Christianity; but as the teachings of a great philosopher his works will never be forgotten. In fact they will have in some respects a wider hearing and following when the European and American world studies more the interesting and instructive history of Cathay.

Confucianism became a religion not through any intent or purpose of its founder. He never endeavored to start a religion, to be considered as a god, or as a prophet of a god. The doctrines, precepts, and philosophy of Confucius became a religion because they were purer and higher than the conceptions of any other religion that in those days was offered to the people; they were beyond and above the teachings of Laotze or Buddha in the mind of the average Chinese ruler or vassal. By natural evolution in the imagination of the people he became in a measure a god, but it is well to be remembered that he did not believe in any existing God, and there is no hint in his philosophy of a future life. When asked what was his opinion of death he replied: "How can one know death when one does not know life"?

To those who have firm belief in a living God and in the immortality of the soul, it would not seem that Confucianism could stand as a religion against the expanding influence of Christianity. No matter how much we admire the character and teachings of Confucius, there are lacking in his philosophy the two great essentials of faith and hope which are so dear to the Christian world. Charity there is in Confucius' teachings, and that is a principal element in making them strong.

Love, respect, and worship of ancestors, which have played so important a part in China's political, material, and moral development, are fostered by the precepts of Confucius. His portrayal of the lives of the mighty Yao and Shun of the mythical days, and later of Wan Wang, Wu Wang, and Chau King, of the Chow dynasty, tended to develop a deep sense of ancestral homage. In the growth of China this influence has, on the one hand, protected the family and the state, and, on the other hand, retarded material progress. Worship of ancestors, with its virtues and faults, has been a synonym for conservatism in China. What was sufficient and satisfactory to their ancestors should be sufficient and satisfactory for the present generation! The fear, for instance, of disturbing the rest and peace of ancestors and of doing unpardonable slight to their memory has in a measure prevented the opening of the earth for its mineral and metals, has retarded invention, and in these later days checked such far-reaching enterprises as railway construction and further modern development of China's material resources.

If Confucianism is a religion, it is *the* religion of China; but Buddhism is also in a sense *the* religion of China, with Taoism, founded by Laotze, in a pronounced secondary position. Every Buddhist and every Taoist, however, is a disciple of Confucius to a certain degree, while a great number of the followers of Confucius are not Buddhists or Taoists. Every Chinese child is a student of Confucius. All of my Chinese servants could recite his principal precepts. They seemed to understand them also; but oftentimes they were in doubt about their real respect for Buddha and Laotze.

It is not within the scope or purpose of this paper to compare the teachings of Christ and Confucius; but in dis-

missing reference to such comparison it is interesting to remember the words of one distinguished savant, Dr. Legge. He says: "The teaching of Confucianism on human duty is wonderful and admirable. In the last three of the four things which Confucius delighted to teach—letters, ethics, devotion of soul, and truthfulness—his utterances are in harmony with both the law and the gospel."

Possibly the remarkable honesty of the Chinese as business men and merchants in dealing with foreigners, which has been a marked national trait in their commercial relations during the last sixty years, should be attributed to Confucius. Possibly it is due to native shrewdness; but it is so surprising to the average foreigner that it is worth recording here.

Mr. Thomas Whitehead, the distinguished manager of the great chartered bank of India, Australia, and China, which is the second largest banking house in Asia, says that his institution has never directly lost a penny through Chinese dishonesty in transactions representing many millions of sterling. The famous Asiatic foreign house or hong of Jardine, Matheson & Co. declare that they have lost more money to 8 per cent of foreigners than to 92 per cent of Chinese, in a total trade of 100 per cent, covering a period of nearly sixty years and representing one hundred millions sterling!

Mencius was a scholar, thinker, and philosopher second only to Confucius. His time is placed about 300 B. C. His teachings, moral deductions and precepts, epigrams, and wise sayings are studied and committed today by every native in China, and, next to Confucius, he has exerted a mighty influence on Chinese development.

Of the personal Laotze we know but little. He was a man of profound learning, but there has been handed down no such historical record or collection of his writings as we have of his colleagues, Confucius and Mencius. His religion, Taoism, has at all times exerted a profound influence on China's history, but has never stood with the continuous strength of Confucianism. Some monarchs were entirely under its sway, while others decreed death to all who followed it. The original Taoism was perverted and changed, it was even assimilated by the Buddhism of China, for this variety is a corrupted branch of the old Indian stock. There was much in the early Taoism that suggested thoughts and ideas akin to Christianity. The immortality of the soul was partially pictured, though in a material, rather than in a spiritual, sense. In later days Taoism became the superstitious theory of magicians and of kings who would seek perpetual life through extraordinary elixirs and decoctions. Today it has many astute and devoted followers, but it is decadent as a religion and has passed long ago the day of its influence and power among the great religions of the world.

THE IMPORTATION OF BUDDHISM FROM INDIA

Buddhism in China is a transplanted product. It was brought from India as a sprig of one fruit might be grafted on the tree of another Buddhism was grafted, in a measure, on Confucianism. It would never have thrived in China if Confucianism had been an actual religion like Christianity or if Confucius had been an inspired being like Christ.

Sixty years after the crucifixion of Jesus Christ the Emperor Ming-ti, of the Han dynasty, dreaming of a gigantic image of gold, dispatched an embassy to India to find a new religion. They returned with Buddhism. The doctrine of the transmigration of souls delighted the mighty Ming-ti. The rewards and punishments it outlined seemed reasonable, and the possibilities it pictured of

a future life supplied to him and his people what was lacking in Confucianism. Ming-ti was a practical, business-like monarch and went about the propagation of Buddhism as he did the promulgation of new laws and the collection of additional taxes. In that way it was given an impetus that enabled it to spread throughout all China. It undoubtedly tended to raise the moral standard of the people and nation, and hence was a direct influence on the growth of the kingdom. The Buddhism of today in China bears little resemblance to the purer Buddhism of Ceylon or Siam.

The King of Siam, who is the *ex officio* head of the Buddhist church of the world and one of the ablest and most progressive statesmen in Asia, often told me while I was the American Minister at his court, that the Buddhism of China was such only in name and was inextricably mixed with Taoism and Confucianism. The Chinese emigrant to Siam is at home in its Buddhist temples, but the Siamese who goes to China is not at home in Chinese temples.

There is a passing thought in this connection that almost staggers us. Supposing Emperor Ming-ti's embassy in search of a religion had journeyed to Palestine instead of to India and brought back Christianity? It taxes the imagination to picture the effect on China, on Asia, and on the world at large, if it had come in its purity. On the other hand, we are forced to ask with equal astonishment at the possibilities: What would have been the effect on Christianity if it had been taken in those early days by the Chinese as their official religion?

THE COMING AND EXPULSION OF CHRISTIANITY

But Chistianity did come to China long before the day of modern missionaries. Christianity was taught and fostered for one hundred and fifty years during the middle ages of China, between 600 and 800 A. D. The Nestorians, who taught the new religion to China, thrived for nearly two centuries, or until 781 A. D. About 1625 A. D. the famous Nestorian monument was unearthed in the province of Shensi. Williams, in his "Middle Kingdom," holds that the Nestorians came as early as 500 A. D. He says that the monument is "the only record yet found in China itself of the labors of the Nestorians," and yet it is one of the most perfect of the ancient monuments of China. The inscription tells us that a priest named Olopun came from the distant west, guided by the "azure clouds" of China, bringing with him the "True Scriptures." The emperor, one of the most powerful of the Tang dynasty, gave him a cordial reception and ordered the Scriptures translated and promulgated. In an official edict he said: "Let it have free course through the empire."

Unfortunately for its lasting influence it came under the ban which the Taoists, about A. D. 850, proclaimed against Buddhism through the agency of an hostile emperor. The effort to crush the Buddhists included the Nestorians, and only the monument remains. If sufficient time had passed for Christianity to have spread itself as had Buddhism, this one attack would not have ended its life in Cathay until again revived by American and European missionaries. It is an interesting coincident that the Nestorians were apparently most severely persecuted in the same section of China where many American and European missionaries were recently massacred.

Before leaving the subject of religions I would add, in response to the general inquiry about missionary work, that I honestly believe, after six years' experience in Asia in both official and private capacities, and after spending much time in China, not only along the coast, but

in the distant interior, that the missionaries are doing far more good than harm, and that they should have the moral support of the American people in the continuance of their labors.

There are incompetent missionaries as there are incompetent business men. They have faults. These should and will be corrected and the work will go on. Missionaries will be a help and not a hindrance in the regeneration of China. The commercial spirit leading to ruthless territorial aggrandizement, manifested by the European powers, must bear the responsibility for the Boxer outbreak as much as the zeal of missionary evangelization.

Such men as Li Hung Chang, Sheng Liu Kin Yi, and Chang Chi Tung have told me unofficially that they had no objection to Christian missionary work where it was carried on by worthy men, but complained that too often indiscreet and incompetent men were in charge who excited hostilities and caused trouble for the majority of the missionaries who were qualified and successful.

This discussion of religions, into which I have gone to some length, although cursorily, began with a consideration of the character of the teachings of Confucius, who lived in the illustrious Chow Dynasty period. From the date of its ending, in 255 B. C., we pass on rapidly down through the long historical corridor of succeeding and changing Chinese dynasties. Some we admire; some we abhor. Some we praise; some we decry, but it is the same old story of ups and downs, great and little men, good and bad men, until we grow almost weary of the tale, and are constantly reminded that in the dim future these present days of critical negotiations at Pekin may seem of little importance. Let us hope that their conclusion and results may warrant a higher measure of praise than we can bestow on many of the crises of the limitless but *fascinating* past.

THE GREAT WALL

During the Tsin dynasty, which succeeded the Chows, the major portion of the great wall of China was constructed. This was approximately 240 B. C., but some 250 or 300 miles of the wall were added nearly 18 centuries later, in 1547 A. D., by an emperor of the celebrated Ming dynasty. Let us remember what this means. A wall begun at one time two centuries before Christ was completed nearly sixteen centuries after Christ. Can anything better illustrate the great age and astonishing conservatism of China than this simple record? What are the sixty years of China's present modern foreign relations—one cycle of Cathay—in comparison with these eighteen centuries which history tosses up and off for our study as if only eighteen days!

The builder of the wall was, however, a great man. Some call him the Napoleon of Asia. Chung was his name, or Hwang-ti, as he called himself. He built magnificent palaces, constructed roads, dug canals, and did all in his power to make his kingdom mighty and prosperous, but was guilty of one unpardonable offense. Wishing to go down to posterity as the *first* king of China, he ordered the destruction of all the old records and libraries, and decapitated hundreds of scholars. For this he was never forgiven by the Chinese people, and few praises are now sung in his honor. Fortunately for China sufficient records were preserved, and literary men survived to replace later the destroyed records, legends, and histories. He was succeeded by the Han dynasty, which held sway from 206 B. C. to 225 A. D.

RELATIONS WITH THE ROMANS

The Han dynasty, that started before the Christian era and reigned into it over two centuries, saw the first commercial relations established with the Roman

Empire. The latter even sent an embassy to China, and presents were exchanged. Ptolemy and Pliny wrote of the Seres, a name which described the Chinese; and China was distinguished at times far apart by Sin, Chin, and Sinae. "The reign of the Seres was a vast, populous country, touching on the east the ocean and the limits of the habitable world, and extending west nearly to Imaus and the confines of Bactria," says Yule, adding, "It seems probable that relations existed from the earliest times between China and India, and possibly, too, between China and Chaldea. The 'Sinim' of the prophet Isaiah is by many taken to mean China, and the Ptolemys 'Sinae' are generally understood to have been the Chinese."

In the forty-ninth chapter, twelfth verse, the great prophet says, "Behold, they shall come from far: and, lo, these from the north and from the west; and these from the land of Sinim."

I referred to the honesty of the Chinese; that same story was told in Europe twenty centuries ago. Therefore the reputation of the Chinese for integrity, in spite of all that is said against them, has some good foundation. Justinian was the next great western writer who discussed the Chinese; and then Marco Polo, returning from the magnificent court and mighty empire of the imperial conqueror Kublai Khan in the thirteenth century, awoke the world to its first actual appreciation of the extent and power of Cathay.

The Roman Empire was often described by early Chinese historians as a nation with which China enjoyed trade exchange. The land of Tatsin-Kwoh was the name of this European kingdom in Chinese terminology.

While Rome was in the height of her glory and preparing the way for her downfall the Han dynasty was sailing on the flood tide of prosperity, great wars, territorial aggrandizement, and splendid material progress. When we consider that such an eventful period is included in the records of Chinese history, we wonder that we have not given it more attention in our study of former civilizations. In those days we are told that temples and palaces were erected larger and grander than those of contemporaneous Rome and Greece; canals were dug of sufficient depth to float ponderous junks; walls were built that reached over high mountain tops; roads were opened that connected capitals and trade centers; wars were waged that killed millions of men, and peace and strife alternated from decade to decade. There was bloody civil contention among the feudal chieftains at one time, and then again a war of the entire united empire against a foreign enemy. The present Boxer uprising would have been treated in those martial days as an amusing incident, and no foreigner would have been spared to tell the tale and write lurid accounts for the magazines.

The contemplation of China's wonderful past suggests at once the question, Why, if such great deeds were done and such splendid buildings, palaces, and roads were constructed, are there not more tangible evidences remaining of these and later glorious periods? The answer is simple and conclusive. First, every new emperor, or the founder of each new dynasty, who was not friendly to his predecessor seemed prompted by an immediate and overwhelming desire to destroy all the signs of his predecessor's work and power, and proceeded to raze not only to the ground but obliterate all monuments of former glory. Secondly, there are remaining, even against such adverse conditions, more monuments of the past than are generally remembered in a discussion of this subject, such as the great wall, the Ming tombs, the Temple of Heaven, the Grand Canal, paved roads, great arched bridges, porcelain pagodas, and numerous lesser signs, like the Nestorian Monument.

Students of China will await, moreover, the new life in the empire and the opening of the interior in the hope that excavations in interior cities and the bringing to light of old records may tell us more than we now know and better explain and illustrate the conditions of the dazzling past.

China's famous competitive examinations were begun under the Hans; a penal code, the model of all subsequent ones, was drawn up, and, as before recorded, Buddhism was first introduced from India. The limits of the empire were extended until under the Western and Eastern Han dynasties they included Szechuan, Yunnan, and Fukien.

Romance tells its story of these times in the great Chinese historical novel entitled "The History of the Three States," which immortalizes in a halo of glory that period, which was at its height about three centuries after the birth of Christ. Every Chinese delights in this graphic story of valorous deeds.

We now pause at the threshold of the illustrious Tang dynasty, that shaped Chinese destinies for three hundred years, A. D. 618–907. To reach this period we pass the Tsin and Eastern Tsin dynasties, that succeeded the Hans and ruled for one hundred and fifty years with another group of fifteen monarchs. A few lesser dynasties followed, and then the first Tang began his beneficent sway. During this dynasty Korea became an acknowledged dependency of China, Siam sent tribute-bearers, and Persia sought aid from the Chinese Emperor in a war with other lands. It was one of the Tangs that welcomed the Nestorians. The canal system of China was extended, libraries were built, schools opened, and the people were occupied peacefully and happily with agricultural pursuits for unusually long periods. The Hanlin Library and College was founded in 755, the writings of Confucius were newly annotated and revised, and poets, essayists, and historians thronged the courts of the emperors in place of eunuchs and concubines. But if preceding dynasties had been disgraced with beautiful and dissolute but powerful women, who controlled the empire by controlling their emperors and ministers, the Tangs had likewise the cruel and immoral but brilliant and able Empress Wu. She ruled China with a rod of iron and to the benefit of the people for fifty-four years.

Arab travelers who visited China in those days returned with stories of copper money, rice wine, and the use of tea as a beverage. Envoys of the Pope at this period sought to know more of China, and Mohammedanism also then first gained extensive entrance into China and became a factor in its development.

Looking to Europe, we find that England was then divided among the Saxon princes, and France and Germany were in that chaotic state which preceded the reign of Charlemagne. The discovery of printing is ascribed to this period, or about A. D. 581, nine centuries before Caxton introduced printing into England. In the siege of Tai-yuen, in the eighth century, gunpowder was used in cannon that threw 12-pound stone shot some 300 paces. After twenty emperors had reigned and China began to see the approach of a modern period of history, the Tang dynasty ended with a desolate land, ruined towns, and the capital razed to the ground by fire and vandal conquerors.

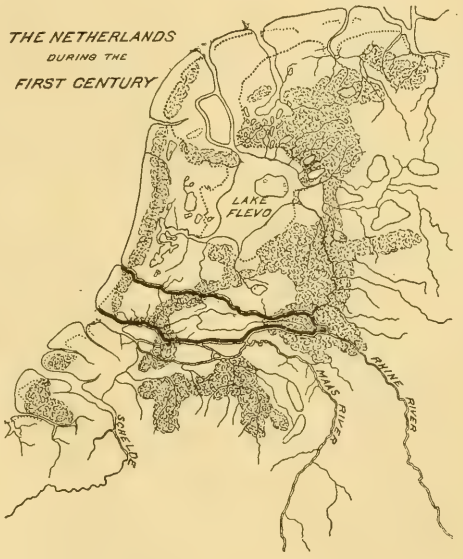
(*To be concluded in the July number*)

THE DIKES OF HOLLAND

By Gerard H. Matthes, United States Geological Survey

TO obtain an idea of the important role the dikes have played in the development of the Netherlands, and of the problems with which the inhabitants of that country have had to contend, it is necessary in the first place to understand how the soil of the Netherlands was formed, and what the peculiar conditions are that have rendered the existence of this unique little country possible. A few words concerning the geology of the region, which dates back to a time by no means remote, will therefore be of interest.

Geologically speaking, a large portion of the Netherlands may be said to have been formed only yesterday. This portion, which comprises the western and most interesting half of the kingdom, owes its origin to the alluvial deposits brought there by three large rivers—the Rhine, the Meuse, and the Schelde—the estuaries of which unite to form what at first glance appears to be a delta. The large amount of sediment discharged by these rivers, together with the action of tides and currents in the North Sea, were the primary causes of the formation of extensive series of sandbanks and bars off the coast, and as these banks grew higher and finally became exposed to the action of the wind at times of low water, there came into existence sandhills, commonly known as dunes. The coast in those days partook much of the nature of a "haff," such as is found today on the German coast on the Baltic Sea, or along our own coast, notably at Pamlico and Albemarle Sounds. A long tongue of land running parallel with the coast inclosed a body of shallow water into which discharged the three rivers. It is natural to suppose that after the formation of this haff, sedimentation progressed rapidly. Heavy deposits of clay gathered in its quiet waters, and later, as the haff grew more shallow and aquatic vegetation be-



came luxurious, extensive marshes came into existence, and the great peat beds which cover so large a part of the area of Holland at the present day were formed.

Interesting as are the successive steps in the formation of the country during those early days, space will not permit here to treat of them at length. Suffice it to be said that after the general level of the deposits had reached that of the sea, there arose vast forests, which at one time covered almost the entire country

of the Netherlands. The rivers found their way to the ocean through numerous tortuous channels, but there remained in the center of the country a small lake, called by the Romans at a later period "Lake Flevo." Thus the soil of the Netherlands, having been formed in part by alluvial deposits and in part by the formation of peat beds, cannot be called a delta formation, in the strict sense of that physiographic term, however much its appearance in a general way may resemble that of a delta.

The earliest records make mention of this region as a low, marshy, and heavily timbered area, protected against the tides of the North Sea by ridges of sandhills, and subject to flooding by both fresh and salt waters.

THE FIRST DIKE-BUILDERS IN HOLLAND

The first inhabitants of this inhospitable region were nomadic tribes of Germanic origin, known as the Catts and the Caninefates, and they must be regarded as the pioneers of dike-building. Though dwelling at first on the higher eastern lands of older formation, it is known that they finally settled in the lowlands, where, exposed to the constant danger of inundations, they soon learned to protect their lives and property by the building of levees.

Perhaps Holland in those days was not as undesirable a piece of land as it might prove in these days. At any rate, as early as 400 years before the commencement of this era, the Romans had begun its conquest, and were undertaking a number of improvements, the magnitude of which leave no doubt as to the value they put on their new acquisition. About 10 B. C. the Roman general Claudius Drusus, in order to relieve the Rhine of a part of its burden, connected it with the Ijsel by means of an artificial canal, which may safely be said to have been the first canal dug by the hand of man in Holland. According to Tacitus, the Roman general Germanicus, a son of Drusus, is said to have transported his army down the canal on floats constructed with the timber cut from the forests. Again, history tells us that the same general Drusus caused a levee to be built along the middle arm of the Rhine, in order to protect the province then called Bat-Aue ("good land") against the inundations caused in spring

The Netherlands of Today and the State of Ohio compared

by ice jams on the rivers. This same levee was completed some years later by general Paulinius Pompeus, and extended to the mouth of the Rhine at Katwijk, where there existed a gap in the dunes through which the Rhine discharged into the sea.

At some distance from its mouth, on the inland side of the dunes, the Romans constructed a large castle, known as Castle te Britten, and on an island in the estuary they erected a light-house, which bore the name of General Caligula. The castle is of interest because from the present location of its ruins important

conclusions may be drawn as to the shifting of the dunes. After having been sacked and burned by the Batavians, rebuilt again and destroyed once more by the Normans at a later date, the ruins of the castle were during the eighth and ninth centuries gradually covered by the shifting sands of the dunes, which were slowly being transplanted landward by the winds. The ruins disappeared and had been forgotten, when suddenly, after the severe storm of Christmas, 1520, they reappeared once more, but on the beach west of the dunes. Since that time they have in the course of centuries repeatedly been denuded and covered up again, and at the present day lie submerged in the sea.

RECESSION OF THE COAST LINE

It has been estimated from these facts that the dunes near Katwijk have migrated east a distance of two miles in about eighteen centuries. At other points along the western coast of Holland this receding movement has amounted to as much as six and seven miles during the same period.

It was not easy to put a stop to this alarming recession of the coast and consequent loss of land, together with the destruction of numerous flourishing villages. It has been permanently effected, however, by planting on the seaward side of the dunes a species of grass (*Arundo arenacea*), known in Holland as "Helm." This plant can sustain itself very readily in the finest and purest of sands by means of extraordinarily long and intricate roots, and is therefore well qualified to counteract the shifting of sand. The grass is planted by hand in tufts not quite two feet apart, aligned in rows. That this was a laborious piece of work needs no demonstration, when it is borne in mind that there extend along the coast of Holland a chain of dunes of a total length of 200 miles, varying in width from 400 yards to three miles, while the elevations range from 60 to 200 feet above sea-level. In other places forest growth has been started on the dunes lying further inland, and the results have been very gratifying.

1,500 SQUARE MILES OF LAND SUBMERGED IN THE INTERIOR AND THE FORMATION OF ZUIDER ZEE

The retrogression of the dunes was a source of alarm; yet, on account of its slowness, the movement had not at first made itself manifest. Very serious changes had taken place, however, in the interior within a comparatively short period. Furious storms in the North Sea during the years 693, 782, 839, and again in 1170, 1230, and 1237 had caused a washing away of large sections of peat land situated between Lake Flevo and the North Sea. This wholesale destruction of land culminated in 1250, 1287, and 1295, when during the spring tides of those years Lake Flevo had become an inlet of the North Sea. It is estimated that this loss amounted to nearly 1,500 square miles of land, and submerged a number of flourishing villages. Heavy dikes were then built, inclosing the so-formed Zuider Zee, except at such points where it communicated with other bodies of water, in order to check all further encroachments on the land. Its form has since been practically the same as now appears on our maps.

With the advent of the fourteenth century began a period of active dike-building in Holland. Not only the Zuider Zee had swallowed much rich, arable land, but many of the interior bodies of water, at times of storms, were making similar trouble, and inundations caused by the large rivers were frequent. Obviously, as the country became more closely settled and land became more valuable, every new inundation caused more loss of life and property than had

previous inundations. These catastrophes, attended with the loss of thousands and thousands of lives, fill many a sad page in the history of the country. Dike-building became a serious matter and began to receive the attention which it had long needed. Flimsy dikes and levees were gradually transformed into heavier structures, and the physical outlines of the Netherlands were thus rendered more permanent and may be said to have suffered little change since that time.

The province of North Holland about the year 1288, although extensively protected by numerous dikes, was dissected by bodies of water of all sizes, such as the Schermer, the Beemster, the Purmer, the Starnmeer, the lakes west of Alkmaar, and the Langemeer, connecting with each other, and also with the Zuider Zee at several points. It was possible in those days to navigate from Amsterdam westward through the Ij, then through the lakes mentioned, and return by way of the Zuider Zee, without finding an obstacle in the form of a dike, or as much as a lock. With the expansion of Lake Flevo into a wide-mouthed inlet of the North Sea, the action of the dreaded tides and storms of the latter were carried into the very heart of the country, thereby raising considerably the levels in the lakes before mentioned and threatening new inundations. To remedy this dangerous situation, the three channels connecting the lakes with the Zuider Zee were closed by means of heavy dams during the years 1311–1400. In the main, however, the aspect of the country changed little between 1288 and 1575. Before the beginning of the seventeenth century there probably was felt little need of securing additional arable land; possibly pecuniary difficulties forbade the expenditure of the large sums required for draining the lakes, and more likely difficulties of a technical nature stood in the way. At any rate, the lakes drained during the fifteenth and sixteenth centuries were few in number. About the middle of the fifteenth century windmills for raising water were coming into use in Holland. These were at first of a primitive character and of low power, but they were applied to the pumping out of lakes in process of reclamation.

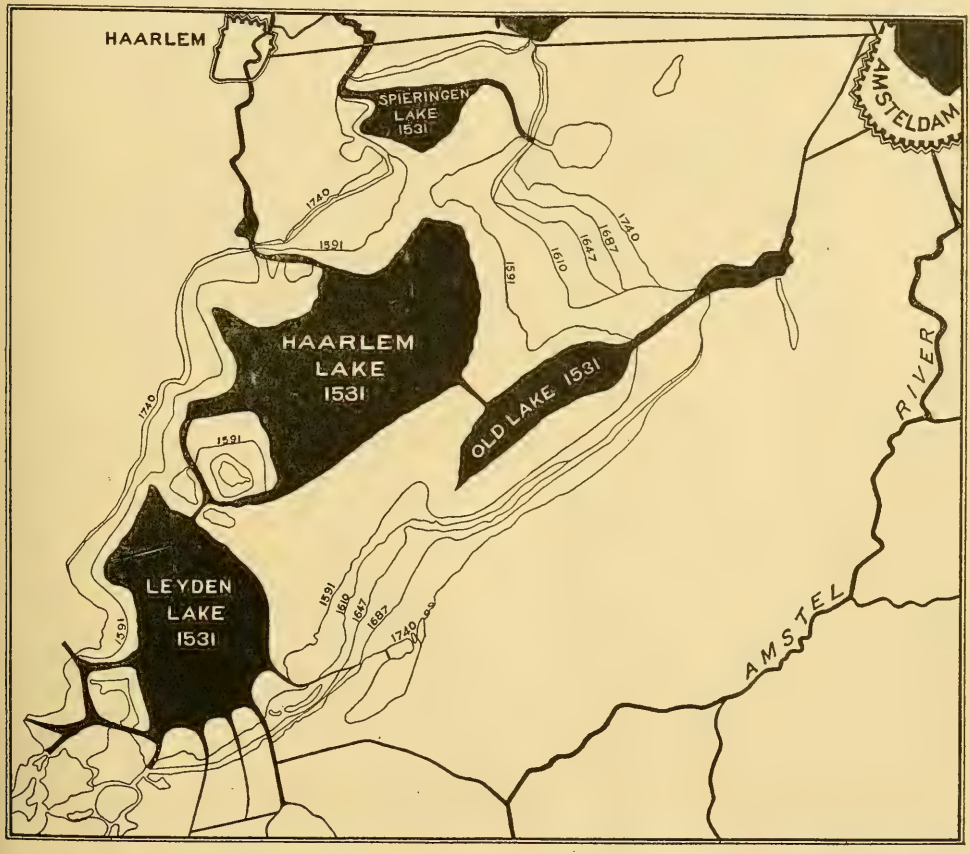
RECLAIMING THE LAND

The great period for reclaiming land, however, did not begin until the early part of the seventeenth century, at a time when prosperity returned in Holland and great enterprises of divers character were begun. With the revived interest in agriculture and cattle-raising, the rich soils covered by the lakes became valuable, and every effort was made to drain them or to keep them within the smallest limits. This became urgent for the further reason that new lakes were constantly being created by the digging away of the peat for fuel. Between the years 1607 and 1643 sixteen lakes were permanently drained, adding to the territory of the Netherlands, within the space of 36 years, an area of 91 square miles, or nearly 60,000 acres.

All these lakes were drained with the aid of windmills. A lake was first inclosed by a dike to cut it off from surrounding bodies of water. This work was always of a difficult nature, consuming much time and money, as it frequently happened that during some storm the dike gave way. The inclosing dike once completed, the windmills, constructed in the meantime, commenced draining off the water into adjacent waterways. These latter were properly connected with each other to keep up the navigation in that section of the country and to carry off the water pumped out of the lake. Such a system of communicating waterways and canals is collectively known as a "bosom," and they in their turn dis-

charge the surplus water into the sea at times of low tide, while at times of high tide they are closed by means of locks. Even after the lake had been drained the same system was preserved, only less windmills being required to keep the lake bottom dry. In general, any section of land artificially drained, and known in the Dutch language as a "polder," has a "bosom" surrounding it, into which is delivered by the windmills all the water that collects in the polder. The polder, for this reason, is intersected by a network of ditches, carefully spaced and graded in such a manner as to drain the surplus moisture from the soil and conduct it to the windmills. The amount of ditching required to accomplish this as a rule covers an area equivalent to one-twelfth of the total area to be drained. Thus the Hollanders not only keep their polders dry, but provide at the same time ample means for navigation, the main canals and ditches being from 25 to 40 feet in width.

Before the invention of the steam-engine, windmills were exclusively employed in the work of draining the polders, but as the power of a windmill is rather limited, the lift was as a rule inconsiderable. In later years, when deeper lakes were drained, either steam-engines or series of windmills placed at successive levels had to be resorted to. Thus at the time of the reclamation of



Successive Enlargements of Haarlem Lake

the Beemster 49 mills were constructed, disposed as follows: 11 series of 4 mills each, 1 series of 3 mills, and 1 series of 2 mills. The work was commenced in 1608, when the dike was constructed, and the draining begun in 1612. The cost of this work amounted to $760,000, the total surface thus reclaimed being 17,720 acres.

THE DRAINING OF HAARLEM LAKE

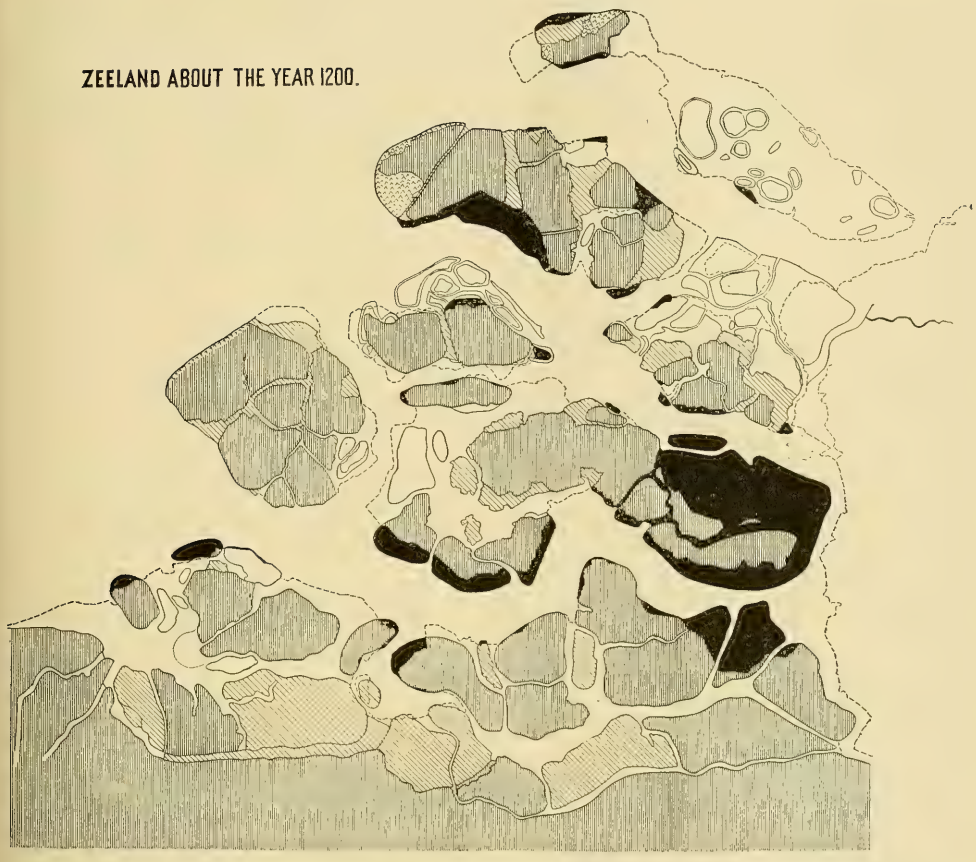
Since the invention of the steam-engine works of a greater magnitude were entered upon. Prominent among the latter is the draining of the Haarlem Lake. Originally there existed in this locality four small lakes, as the old maps of 1531 show us. In consequence of successive storms, which caused the destruction of the adjacent peat lands, the four lakes merged into one, and the new lake thus formed became a source of much anxiety. With the increased surface exposed to the action of the winds, the waves on the lake became more powerful, and large sections of peat land were bodily swept away. The four lakes in 1531 covered an area of 22 square miles, but their surface nearly doubled in 1591, when they merged together. In 1647 they covered 56 square miles; in 1687, 60 square miles, and in 1848, 65 square miles, or three times their original area. When during a storm in the fall of 1836 the city of Leiden was flooded by the waters of the lake, the situation became untenable and the government decided to drain the lake.

Between the years 1840 and 1846 the lake was inclosed by a dike 37 miles in length. Three powerful engines were built of from 380 to 400 horse power each, the largest one of which operated eleven pumps each 63 inches in diameter and with a lift exceeding 15 feet. With the aid of these engines the lake, which averaged 14 feet in depth, was pumped dry during the years 1847 to 1852, exposing 42,000 acres of excellent arable land, for with the removal of the peat by the storms the rich alluvial clay underlying the latter had been laid bare. The government has felt itself amply repaid for the enormous sum of $5,568,000 which was expended on this work. The sale of land yielded a revenue of $3,142,800, and indirectly a great many incalculable advantages have been derived from it. (See map on preceding page.)

The last of the great works of this class that have been accomplished is the reclamation of the Ij, at one time an inlet of the Zuider Zee, and the construction of the large canal connecting Amsterdam with the North Sea. This work was completed in 1876 and the canal opened to navigation on November 1 of that year. Twenty-two square miles of excellent land were thus added to the kingdom. Space does not permit here of a description of the technical difficulties that were overcome in the construction of this magnificent canal, through which the largest sea-going vessels now pass daily on their way to and from Amsterdam.

LAND RECLAIMED FROM THE SEA

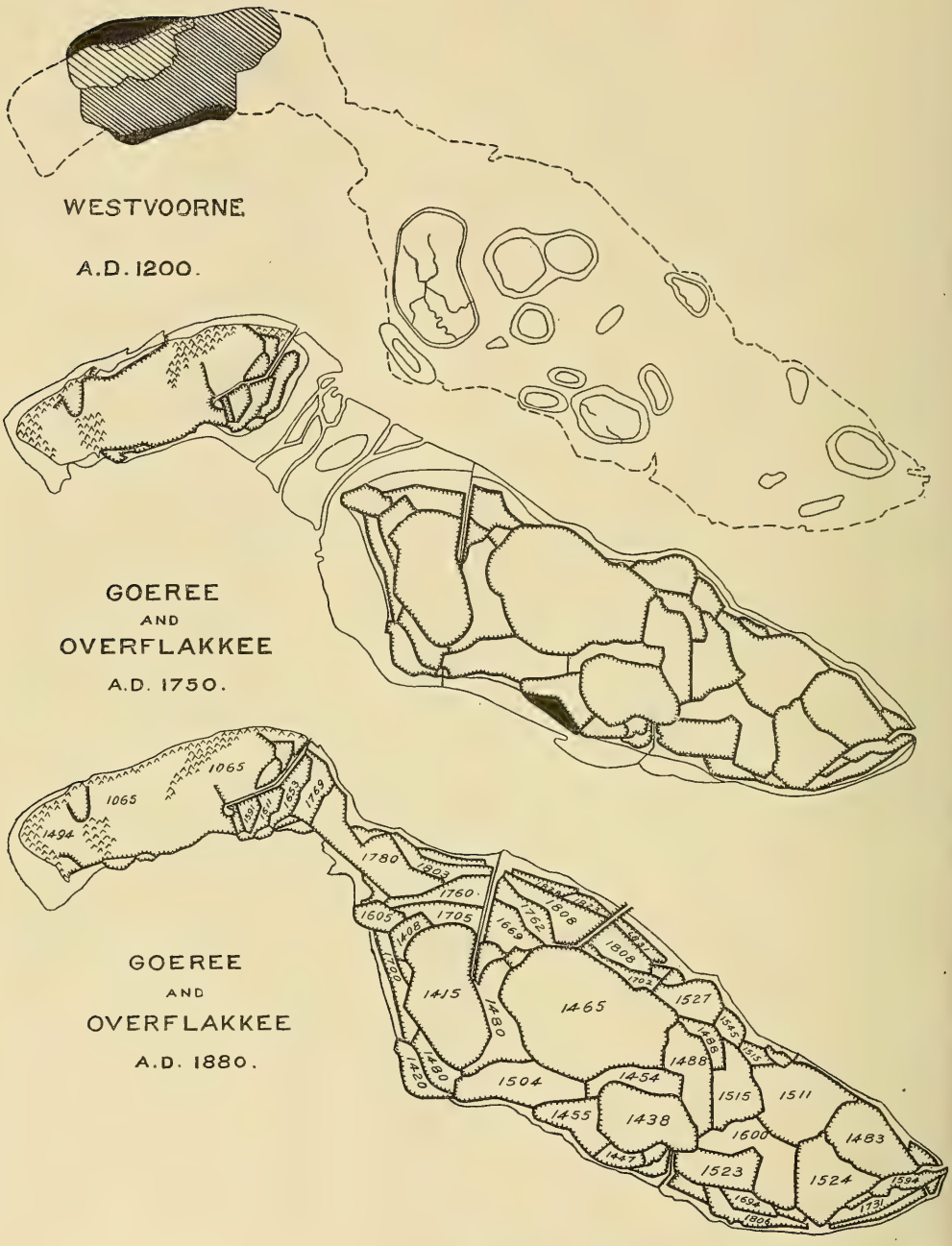
Next to their use in reclaiming land covered by fresh water, the dikes have been of great importance in reclaiming land from the sea. The province of Zeeland, which occupies the southwestern corner of the Netherlands, is composed of a number of islands, conspicuous for their fine agricultural lands and for the thrifty populations which they support. The larger part of this province has been formed by the hand of man out of the numerous shoals, clay-banks, and sandbanks that existed here centuries ago. The archipelago of Zeeland, as well as some of the islands situated to the north of it, lie scattered in the broad estuaries of the principal rivers, and are consequently entirely alluvial formations. The fine silt carried in suspension by the rivers was de-



posited, building up the claybanks little by little, until they became exposed at low water in the shape of mudflats.

As early as the year 1000 enterprising individuals had begun to build small levees along the edges of these flats, in order to prevent the tides from washing over them, and gradually there arose from out of this shallow body of water a number of islands, the nuclei of the present archipelago. As the banks became larger, built up by the river deposits, aided by artificial devices for catching silt, new dikes were built further out into the sea, and the islands grew slowly as piece after piece was added to them. (See diagrams, p. 226.)

The growth of these islands is an admirable illustration of the untiring and steadfast persistency so characteristic of the Dutch people; for the work of reclaiming land from the capricious North Sea was fraught with much danger and tribulation. Again and again during severe storms the sea broke through the dikes and invaded the land acquired with so much painstaking labor, and in several instances areas were irrevocably lost. It must be remembered that this land was obtained by draining the water from an exceedingly humid, clay-like soil. This drying-out process, for such it really was, entailed as a natural result a shrinkage of the solid materials, which



These three Diagrams show the Enlargement of one small Mud Flat to ten times its original size

in many places has been very considerable. Lands that were at first at a level with tidewater have shrunk in the course of years from four to seven feet, until their level has sunk below that of mean low water. When the sea therefore succeeded in flooding such low areas, the possibility of their being reclaimed was practically forever ended. The shrinkage of the soil has manifested itself throughout Holland wherever clay and peat are encountered. It is therefore evident that the level of the land of the Holland of today is many feet lower than it was at the time of the Romans, when the first dike was built. The level of the provinces of Zeeland and Holland ranges between two and six feet below mean high water, while that of the drained areas is much lower, reaching a depth in some cases of 20 feet below mean high tide. Reclaiming land from flats in shallow waters has also been practiced in the northern provinces of Friesland and Groningen, though not as extensively as in Zeeland.

THE CHARACTERISTICS OF THE DUTCH DIKES

The problem of building dikes in a country possessing a soil which offers so little choice in the way of building material as does Holland is to any one but a Dutchman very perplexing. The country has not a single quarry, nor is loose rock available; the few woods that exist are being preserved with great care, and no timber can be cut from them for lumbering purposes. All that the soil of Holland offers is in the form of sand, gravel, and clay, for peat is worse than useless in construction works; and not only are the available materials poor, but suitable foundations upon which to erect dikes or, for that matter, any structures whatever, are totally absent. This is the problem that has been solved by the Dutch engineers through generations and generations of experience.

It is not within the scope of this paper to describe the many different kinds of dikes in use: their forms vary as circumstances require, and a lengthy discussion of them would lead into endless technical details. In brief, the principal features may be described as follows:

Compared with similar structures elsewhere, the Holland dikes are noteworthy for their great width; the river dikes are built with a crown, usually of from 15 to 20 feet wide, while the common type of the Mississippi levees has only a crown width of 8 feet, the height being about the same. The slopes are gentle, a common grade on the water side being three and a half to one, and on the land side two to one. A characteristic feature of the Dutch river dikes is what is technically known as the "banquette," a sudden widening of the dike near its base, which serves to reinforce the dike, and is specially designed to insure imperviousness where the hydrostatic pressure is greatest. The banquettes are built on either side of the dike, and vary in width from 10 to 30 feet. The larger river dikes range in height between 10 and 16 feet above the adjacent land, while the level of their banquettes is 8 feet below the top of the dike.

The materials used in their construction are sand and clay, and in the case of the ordinary dikes the water side is rendered impervious by means of a heavy layer of stiff clay. As a rule, no special preparations are made for the foundations, except where the soil is of a very treacherous character, when fascine mattresses laid in tiers are used, in very much the same manner as along the Mississippi. Wherever riprap or stone revetments are required, as, for instance, on the sea dikes, where the erosive action of the surf is considerable, basalt blocks brought from Germany are laid on heavy layers of brush. In many places piles are driven at the base of the sea dikes in order to break the violence

of the breakers. Nearly all masonry in engineering constructions is of Dutch brick, which is of a very superior quality. In breakwaters or piers, however, concrete blocks are used exclusively, as neither bricks nor basalt would furnish a bond strong enough to withstand the impact of the waves.

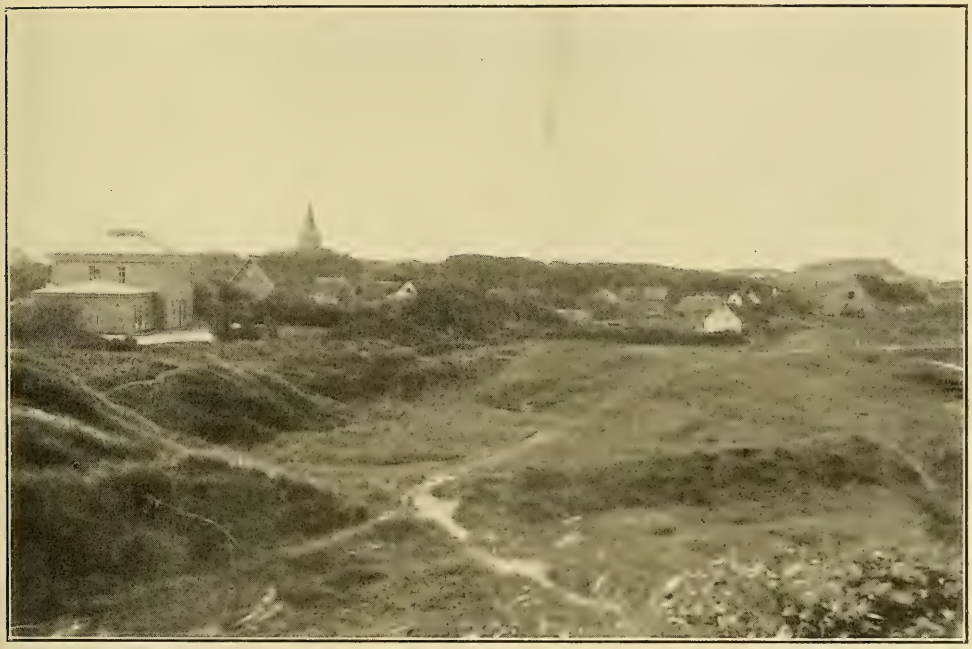
ENGINEERING PROBLEMS

From a hydrographic point of view, the Netherlands present a very unusual spectacle. While the eastern elevated portion has a natural topography of its own, and consequently natural lines of drainage, the western lowlands are devoid of all drainage whatever, and every drop of rain water that falls, as well as all seepage water, must either evaporate or be pumped up and discharged through artificial means into the ocean, if accumulations and inundations are to be prevented.

Statistics show that in 1896, 2,519 square miles of polder land were being maintained with the aid of 444 steam-engines and 247 windmills; 1,234 square miles were being maintained with the aid of 1,706 windmills, or in all 2,397 pumping plants were required to drain 3,753 square miles.

What at one time were natural channels and water-courses have been since inclosed between dikes, and the level of their waters is now higher than that of the adjacent land. The large rivers that flow through these low districts are therefore here no longer rivers in the strict sense of the word, as the features and problems which they present are very distinct from those characteristic of natural streams. The smaller streams have in reality ceased to exist as such. For instance, the northern branch of the Rhine, along which general Drusus caused a levee to be built, is no longer a river; its waters no longer flow; it is

Forest Growth on the Dunes



The Dunes near Domburg, in the Province of Zeeland

nothing but an artificial channel, held between embankments and divided into a series of sections closed by means of locks. No longer does it empty its waters into the sea at Katwijk, where the light-house of Caligula once stood on an island in its estuary; but when the lock-tender at that point has orders to do so, some of its waters are allowed to escape at low tide when it is considered perfectly safe. The same condition is true of the smaller streams of the polder lands. Protected on the sea side by the dunes and dikes and partitioned off in the interior by an endless array of dikes which skirt the water-courses and canals, surround polders, and also serve as embankments to railroads and highways, Holland partakes much of the nature of a huge ship with water-tight compartments.

The immense amount of engineering which is required to keep up this complicated system of dikes and waterways has always been a source of interest to technical men in other countries. No haphazard guesses are made as to the amount of water permissible in any particular waterway, nor as to the height or size of dikes required. Matters of this nature are determined with great nicety through the accumulations of past experience. As one waterway is frequently made to relieve another and the number of combinations must be varied as circumstances require, a knowledge of the fluctuations in the levels of all bodies of water becomes paramount. In order to supply this information, no less than 172 gage rods are maintained throughout the kingdom along the coasts, at estuaries, on large rivers, on canals, bosoms, and small streams, and a few even are located in foreign countries, as, for instance, the gage on the Rhine River at Cologne, Germany, which

has been maintained there by the Dutch Government since 1772. In order to derive the greatest possible use from the data so obtained, all the gage rods in the kingdom are referred to the same baselevel, mean high water, generally denoted by the symbol AP, and the heights of water thus indicated by them give directly the elevation of the water-levels with respect to that of mean high water of the sea.

The present kingdom has an area very nearly equal to the combined areas of the States of Connecticut and New Jersey.

Connecticut.....	4,990 square miles.
New Jersey.....	7,815 square miles.
Netherlands	12,738 square miles.

About 59 per cent of this area consists of alluvial formation, and is inclosed by dikes and provided with artificial drainage. There are, therefore, about 7,515 square miles of lowlands, very nearly equivalent to the area of the State of New Jersey, while the remaining highlands would cover an area about equal to that of the State of Connecticut. The discharge of the Rhine at the point where it enters the country is similar to that of the Tennessee River, while the flow of the Meuse may be compared with that of the Potomac.

SMALL AVERAGE RAINFALL IN THE NETHERLANDS

As a large part of the Netherlands is drained artificially, a few words concerning the rainfall will be of interest. The country enjoys the unenviable reputation of possessing a wet soil and a still wetter atmosphere. Both of these attributes are popular exaggerations. The atmosphere of the Netherlands is frequently moist—that is, it contains at times a high relative humidity—but the rainfall nevertheless is moderate, not to say small. As compared with the United States, it will be found that the amount of precipitation that occurs annually in the Netherlands is about the same as that of the Great Plains region. The normal precipitation for the Netherlands, as derived from observations extending over more than a century, is about 26 inches per annum, or only 5 inches more than half of the amount of rain that falls annually in Washington, D. C.; and, in spite of the reputed moist atmosphere of the Netherlands, the evaporation during the early summer months exceeds the precipitation.

*Table of Evaporation and Precipitation from Observations Made at Zwanenburg, near Amsterdam, During 1743–1843.**

Months.	Normal precipitation.	Normal evaporation.	Excess— Precipitation.	Excess— Evaporation.
	Inches.	*Inches.*		
January.....	1.49	0.33	1.16	.....
February.....	1.46	0.57	0.89	.....
March.....	1.43	1.37	0.06	.....
April.....	1.49	2.39	.....	0.90
May.....	1.56	3.26	.....	1.70
June.....	2.09	3.74	.....	1.65
July.....	2.69	3.74	.....	1.05
August.....	2.97	3.25	.....	0.28
September.....	2.82	2.16	0.66	.....
October.....	3.09	1.24	1.85	.....
November.....	2.76	0.70	2.06	.....
December.....	2.03	0.53	1.50	.....
Total.....	25.88	23.28	8.18	5.58

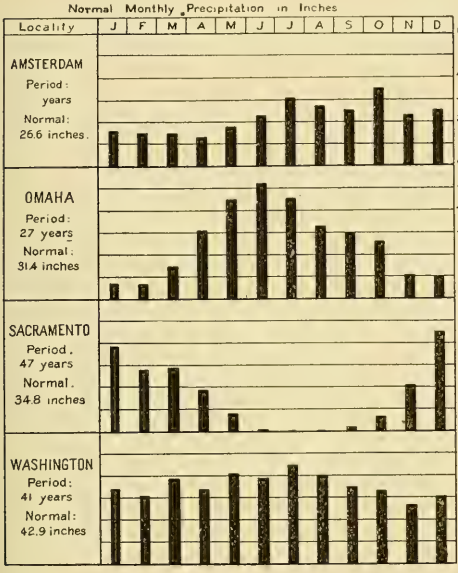
In other words, there is a decided dry season, during which droughts are by no means uncommon. In order to keep the water in the ditches at the proper level, to prevent plant-growth from suffering during such droughts, an efficient remedy is found in allowing the water in surrounding bosoms and canals to run back into the polders, and the usual process of their maintenance is thus actually reversed.

The polder lands known as Rijnland,

* From A. A. Beekman, *Nederland als Polderland*, p. 100.

an area of 417 square miles, it is estimated consume annually no less than 90 millions of cubic meters of water from adjacent rivers.

The climate of the Netherlands presents therefore an interesting anomaly. In spite of its small rainfall it does not exhibit any of the characteristic features of a semi-arid country, with the exception of some sandy, barren areas which are incapable of producing anything and are actually to be classed as desert



lands. Though an equal annual rainfall in the Great Plains region is not sufficient to produce forest growth, the Netherlands were practically entirely forest-clad at a period not so very remote, and probably would be so now but for the deforestation which has naturally attended its settlement. This anomaly is easily explained by three factors: the consistency of the Dutch soil, which renders it capable of absorbing and holding large quantities of water; the inexhaustible perennial streams and other bodies of water that feed it, and last, but not least, the even distribution of the rainfall throughout the year. The lack of ample precipitation is thus more than offset by the humid condition of the soil, which makes aridity impossible.

After reviewing all the difficulties and perils with which the Hollander has had to contend in the building up of his country, it at first sight appears strange that he should ever give up any portion of his valuable lands to the dangerous element that he has for centuries fought so desperately. But as in the course of the history of every nation it sometimes becomes necessary that the welfare of one or more individuals should be sacrificed for the good of the country or of the world at large, so there are times when the people of the Netherlands do not hesitate to cause large areas of land to be inundated in order to save what is dearer and more valuable. Recourse is had to such practice during the season of high waters on the rivers and also during times of war.

MEANS OF PROTECTION AGAINST FLOOD DISCHARGES

The rivers that flow through the Netherlands, like most streams of the northern hemisphere that flow in a northerly direction, are subject during the early spring months to ice jams and sudden flood discharges along their lower courses—a condition well nigh inevitable, as their waters flow from a warmer to a colder climate. In the Netherlands the Rhine, owing to the many channels into which it divides, can be controlled with far greater security than the Meuse, which, though a much smaller river, has a greater fall, and in its narrow, tortuous bed becomes when swollen a source of great danger, threatening to overtop its dikes. Sandbags and the many other devices employed so extensively in similar cases of emergency along the Mississippi levees are then used, but the most efficient relief

Pile Dikes for Protection against Marine Erosion

is afforded by allowing the swollen river to discharge a large part of its burden into the adjacent country. This is effected by providing at suitable points low dikes over which the water will run on reaching the danger line. These low dikes or weirs, known in Dutch as "overlaten," might well be compared to safety-valves. Their location is chosen in such a manner that the water discharged into the open country will do comparatively little harm, and, being confined by dikes especially designed for that purpose, is made to find its way to some low point farther down the river or near the latter's mouth.

Overlaten existed many years ago on all the large rivers, and although their use has saved the country much damage and expense, it has proved a serious evil in another way. It is obvious that whenever a river at the flood stage is deprived at some point along its course of a large share of its burden the natural consequence is a lessening of the current below such a point and the depositing of a vast amount of sediment. Not only is this deposition of sediment at a time when the river transports a maximum amount a very serious evil, but the slackening of the current also offers most favorable conditions for the formation of ice jams. During the past years all the overlaten have been abolished with the exception of one on the Meuse, known as the Beerse Overlaat, which exceeds two miles in length and has been known to discharge with a head of three feet during severe floods, the river at such times being relieved of more than a third of its total flow. The policy at present is to increase the capacity of the river channels by deepening and widening the mouths, and in-

NORTH SEA
FLOOD CHART.
CONDITION OF HOLLAND WITHOUT DIKES
DURING MEAN HIGH TIDE
AND HIGHEST STAGE OF THE RIVERS
Salt Water
Fresh Water

creasing their fall by regulating and dredging their beds. The amount of dredging annually by the government and by private parties reaches a very considerable figure. Nearly all of the sand and gravel used in dike-construction is obtained from the river bottoms by dredging.

THE DIKES A SYSTEM OF NATIONAL DEFENSE

In conclusion, a word should be said about the practice of inundating lands for defensive purposes. The efforts of the Dutch to flood their country, as described in Motley's *Rise and Fall of the Dutch Republic*, and later again in 1672, at the time of the war with France, are well known to those familiar with the history of the Netherlands. The methods employed in those days were not as successful as they might have been, and the blunders that were committed would have led to disastrous results but for the greater ignorance displayed by the attacking party. Thus, in 1672, the French army of invasion could not be prevented from draining some of the inundated lands, although their lack of knowledge of the complicated situation did not permit them to succeed at the time. When cold weather set in the manipulation of the water by the Dutch was so defective that large areas were allowed to freeze over, and the enemy was actually enabled to execute movements on the ice.

The enormous strength of defensive works of this class was, however, amply proved and the Government at the present day has provided an elaborate system for flooding, which forms part of the military defenses of the lower provinces. Lands to be flooded are provided with special gage rods or bench-marks indicating the depth of water required in order to be effective. Special gates have been constructed in the dikes where water is to be turned onto the land, in order to avoid the slow and undesirable process of piercing dikes. The amount of water that is to be drawn for such purposes from bosoms and canals, the discharge that is to pass the gates in a given time, and the ultimate time required to flood a particular area to a certain depth are quantities that have been determined for each section of land with a nicety which no one can fail to appreciate who is familiar with hydraulic computations of the flow of water in open channels and through orifices.

There are at present about 1,000 miles of sea dikes in the Netherlands. The total length of dikes is difficult to estimate, and even if it could be estimated would mean but little, for it must be remembered that the dikes have for the most part in the course of time been destroyed and rebuilt repeatedly. It has not been so much a question of building them as it has been of maintaining them and keeping them where they were. Besides protecting the country from the invasions of both fresh and salt waters, the dikes have served to reclaim no less than 210,000 acres, nearly all of which are good, fertile land. It is to be hoped that the stupendous project of reclaiming the Zuider Zee will some day be carried into effect, whereby there would be added to the kingdom some half million acres of land.

MEXICO OF TODAY*

By Senor Dr. Don Juan N. Navarro, Consul-General of Mexico in New York City

THANKS to intelligence and honesty in the administration of our finances, the continual annual deficit that formerly afflicted Mexico, as it afflicts at present other nations, disappeared in the fiscal year 1894–'95, and in its stead we have since had a surplus. The surplus in that year was $2,373,-434.42, and in the following year more than doubled, rising to $5,451,347.29.

These results are the more surprising when it is remembered that a good part of our revenue is derived from import duties, and it might be supposed that the rapid development and progress of our industries would diminish that source of revenue.

The invoice value of our imports for 1896–'97 was $42,204,095 in gold. Three years later, in 1899–1900, they had increased by nearly one-half, reaching $61,318,175. The invoice value of our exports (in silver) amounted to $86,-058,210 in 1892–'93, to $104,741,443 in 1896–'97, and to $142,615,070 in 1899–1900. The value of gold exported from Mexico in 1892–'93 was $1,451,011, and during the next seven years increased many fold, reaching $7,441,290 in 1899–1900.

At the end of the fiscal year 1898–'99 the federal treasury had a surplus in cash of $27,535,602.62. Because of this prosperous condition of the treasury the taxes were reduced, and a part of the funds were applied to branches of public service:

For building primary schools in the federal district and for the corresponding departments	$1,000,000
To finish the general hospital	500,000
For the building of the medical and geological institutes	200,000
For a new post-office in the capital and for the post-offices of Vera Cruz and Puebla	$1,000,000
For a cable between the peninsula of California and the coast of Sonora	300,000
For the Navy Department	1,000,000
Total	$4,000,000

To prove the financial credit of Mexico in the world, I will mention the conversion of our public debt from an interest rate of 6 per cent into another of 5 per cent. The contract for this operation, executed personally by our intelligent minister of finance, and involving a loan of 22,700,000 pounds, was signed in Berlin by different banking-houses from that city, London, New York, and the national bank of Mexico, on July 1, 1899. The conditions were as favorable as could be offered to any nation of well-established credit, and in the short time open for subscriptions the public of London, Amsterdam, New York, and Berlin subscribed for nearly twenty millions of pounds instead of for the 13,000,000 offered in the markets of those cities. The advantages for our treasury are not only the reduction of the disbursements for interest, a reduction amounting annually to more than $1,800,000, but the reëntry into the treasury of values mortgaged before as securities.

To give the last proof of the credit of Mexico, I will add that the bonds of the new loan began to be sold above par only a few months after they were issued.

The laws issued by the department on institutions of credit have produced good effects, and in November last we had 18 banks of emission, with a paid-up capital of $52,900,000, and with notes in

* Concluded from the May number.

circulation to the value of $65,897,100. Recently, on account of the war in China and the Philippine Islands, many millions of Mexican dollars have been exported, producing a certain stringency in the Mexican money market. The evil is not great, and it will disappear totally, owing to the opportune measures taken by the government and the prudent and conservative policy of the banks.

A few words now about our War and Navy Departments.

I admire the peace congresses, the anti-war speeches and sermons, but my opinion is that those well-intentioned persons lose their time, as there will always be war, because we cannot change the intimate nature of mankind, and universal and perpetual peace is a mathematical limit, to which mankind can approach but never touch, as then humanity would cease to be what it is.

The barbarism of war, the injustices and atrocities inseparable from it, are truths within the knowledge of every civilized man ; but as long as there will be human passions, as long as there will be a great difference of strength among nations, there will be war. I think that there is a practical and efficient method, if not to extinguish what is an impossibility, at least to make international wars very rare, and that is to invent something equalizing as much as possible the strength of the different peoples, leveling to the greatest possible extent the weak with the strong. The invention of dynamite and other explosives, the great improvements in hand arms and in the artillery, under equality of circumstances favor more the defense than the attack, and are therefore in favor of the weak, and are producing in favor of peace and justice an excellent and practical effect. I say justice, because in the majority of cases justice is on the weak side.

An army is a necessity. Justice is represented by the image of a girl having a balance in her left hand and a sword in the right, and unfortunately, but truly, she is obliged to use the sword more than the balance.

Armies at the beginning and the middle of the last century were in many cases bodies of men with interests and exigencies opposite to those of the nation's supporting them.

In our times good armies must be bodies of armed men, taught not only military exercises, but to know that the law is superior to everything; that they form a part of the nation of whom they are servants and not masters. Every citizen must be a soldier, because every citizen has the ineludible duty of keeping peace and order in the interior and repelling the foreign invader. That, it seems to me, is the only way of forming and keeping an army, especially in a country ruled by republican institutions.

In Mexico experience has conclusively shown that officers and even soldiers cannot be improvised, and the very first care of General Diaz has been to establish a good school for instructing scientific officers. The military school of Chapultepec in its actual condition is the fruit of his efforts. Many foreign officers of different nationalities have visited that establishment and believe that it ranks among the first in the comprehensiveness and perfection of military instruction there imparted and in the severe but just discipline to which the cadets are subjected.

From that institution are graduated all the officers of our army, and new rules have been recently issued to prevent the abuse committed by some persons who go there to receive a good and gratuitous education without any intention of serving in the national army.

In the capital and in many other places commodious barracks, affording comfort and good hygienic conditions to the soldiers, have been constructed or are in the course of construction. The soldiers are armed with weapons

pronounced to be the best by technical commissions after long, conscientious, and severe trials, and our artillery includes some pieces of a system invented by one of its best officers, Colonel Mondragon.

The cavalry is composed of excellent riders, very easy to find in Mexico, and provided with horses selected expressly for military service.

The barracks are not as before—places for keeping the soldiers—but schools where reading, writing, and elementary arithmetic and different trades are taught. The troops are subject to the strictest discipline, but at the same time the inferior has always within his reach the means to redress an injustice or to prevent or have punished an ill-treatment from his superior. The military code has been one of the works to which the government has particularly directed its attention, to put it in perfect harmony with justice and the republican institutions ruling the country. The ambulance and hospital branch receives continual additions to its equipment, and is formed from many of the best surgeons and physicians. Experience has proved its efficiency. There are officers selected by the government studying in foreign countries, and their observations are applied to the improvement of our army.

Very recently the government has issued a decree for the reorganization of the army, with the object of keeping in active service the same number of troops we have now, but of supplying the means to increase that force to the extent of some hundreds of thousands in time of necessity, and adding as a reserve the whole nation in the case of a foreign invasion.

Our navy is in its infancy, but the flotilla we have around Yucatan to provision the land troops and to coöperate with them and to subdue those of the Maya Indians who refuse to obey the laws regulating a civilized community is rendering invaluable services. Little by little the number and size of our war vessels will be increased, as our government never loses sight of that important branch of national defense.

To conclude, Mexico is a country endowed with many natural gifts, ruled by a wise government and republican institutions equal to the United States in essential points, inhabited by 14,000,000 intelligent, peaceful, and industrious people, remarkable for their natural courtesy and hospitality, which is extended to all without distinction of nationality.

Mexico cultivates friendly relations with the whole civilized world, and is in the most intimate intercourse with the Government and people of the United States.

The governors of the States, into which the Republic is divided, coöperate intelligently with the federal authorities to establish and maintain all moral and material improvements.

There is a complete and constantly improving system of public education, uniform in the country, which is making education compulsory and gratuitous, and the schools, nearly 13,000, are attended by numerous pupils, and the extension of elementary knowledge to the lowest classes of our people is the best proof of the methods employed.

Industry in all its branches is growing at a worderful pace, and the number of manufactories is in constant progress and their products are of a high grade.

The means of communication are numerous, there being in actual operation more than 9,000 miles of excellent railroads, and more than 61,000 miles of telegraphic and telephonic lines, and different submarine cables for communication with every civilized nation.

The national and international postal system is now very good and growing continually to a degree of great perfection.

The national treasury is in a flourishing condition, and we Mexicans can say

with pride that it is administered with consummate ability and perfect honesty.

Finally, we are in perfect peace, and there is not a single cloud on our political horizon, and therefore it is the time to form upon solid foundations our army and military institutions, following the old Roman maxim, as true today as in the times of Cæsar, "In time of peace prepare for war."

The Mexican people have fought for their independence against great odds, with poor arms, without a cent, and having scarcely the necessary food to maintain life, and have fought incessantly till they have come out victorious. That same people, well armed, with abundant pecuniary resources, and guided by good scientific officers, are preparing for their future and unknown invaders some little surprises probably beyond the expectation of the attacking party.

I have lived in your powerful and interesting country for more than thirty-seven years, receiving uninterrupted proofs from the authorities and people of esteem and consideration, and I avail myself of this occasion to make manifest my heartfelt thanks for so much kindness.

May your Republic be always prosperous, guided by the sublime maxims of its immortal and virtuous founder, who condensed all his wise advice to his people in those five words of eternal truth, "Justice is the best policy."

SIR JOHN MURRAY

SIR JOHN MURRAY has recently returned from a six months' expedition to Christmas Island, a tiny isle 200 miles south of Java, and has thus added one more to his many interesting explorations. Sir John was born in Coburg, Ontario, Canada, on March 3, 1841. He received his early education at a public school in London, Ontario, and at the Victoria College, Coburg, Ontario; but when a youth he removed to Scotland, where his education was continued at the High School of Stirling and at the University of Edinburgh.

In 1868 he took a voyage in an Arctic whaler to Spitzbergen and other places in the Arctic regions. In 1872 he was appointed as naturalist on the civilian scientific staff of the *Challenger* Expedition, and in that capacity accompanied H. M. S. *Challenger* during her scientific circumnavigating cruise from 1872 to 1876. On the return of the expedition he became first assistant, under Sir C. Wyville Thomson, on the commission appointed to prepare the scientific results for publication, and in 1882, owing to the failing health of Sir C. Wyville Thomson, he was appointed editor of the "Challenger Reports." These "Official Reports on the Scientific Results of the Voyage of H. M. S. *Challenger*" filled fifty large royal quarto volumes, and were published at intervals as ready, the first volume appearing in 1880 and the final volumes in 1895. Besides editing nearly the whole series, Sir John Murray was joint-author of the "Narrative of the Cruise" and of the "Report on the Deep-Sea Deposits," and author of a "Summary of the Scientific Results," in two volumes. The British Government has presented copies of these reports to scientific institutions and learned societies in all quarters of the globe.

In addition to superintending the work of publishing the "Challenger Reports," he has during the past thirty years published a large number of papers on oceanographical, geographical, geological, and other subjects,

Sir John Murray

many of them of great interest and scientific value, in which he has expressed some novel and ingenious ideas respecting the past and present condition of our planet.

In 1880 Sir John Murray took part in a scientific exploration of the Faroe Channel, between the north coast of Scotland and the Faroe Islands, in H. M. S. *Knight Errant*, and again in 1882, in the same region, in H. M. S. *Triton*. He was for several years scientific member of the Fishery Board for Scotland, and in 1899 he was appointed a delegate of the British Government at the International Fisheries Conference at Stockholm. He also acted as president of the Geographical Section of the British Association for the Advancement of Science, Dover, 1899.

During eight or ten years he was engaged in a bathymetrical and biological survey of the coast of Scotland in his small steam yacht, the *Medusa*, in which work he was assisted by many scientists. He has also taken an active part in the foundation of marine stations for physical and biological research at Granton, near Edinburgh, and at Millport, on the island of Cumbrae, in the Firth of Clyde, as well as in the foundation of the meteorological observatories on the summit and at the foot of Ben Nevis, the highest mountain in Scotland.

Christmas Island was added by England to the colony of the Straits Settlements in 1889, and is some 12 miles long by seven broad. It has rich phosphate deposits, which are worked by an English company. The works give employment to about 700 coolies and a score of whites, but is believed never to have been inhabited prior to the English annexation.

In recognition of his scientific work Sir John Murray has been awarded the Cuvier prize of the Institute de France, the Humboldt medal of the Gesellschaft für Erdkunde zu Berlin, the Royal medal of the Royal Society, the Founder's medal of the Royal Geographical Society, the Keith and the Makdougall-Brisbane medals of the Royal Society of Edinburgh and the Cullum medal of the National Geographic Society of Washington.

GEOGRAPHIC NOTES

POPULATION OF UNITED KINGDOM

FORTY-ONE and one-half millions of people are now crowded into the United Kingdom. A similar density of population in the United States would mean a total population in this country, excluding the dependencies, of about 1,036,000,000.

For the last ten years England and Wales show a rate of increase of 12.15 per cent, which slightly exceeds their rate of growth for the preceding decade, 11.65 per cent; Scotland, a rate of increase of 10.8 per cent, also a greater increase than during the preceding decade, and Ireland a rate of decrease of only 5.3 per cent, which is little more than one-half the rate of decrease of the preceding decade. The census figures are thus very gratifying to Englishmen, for they show no signs of diminishing national vitality, but rather tend to show increasing national virility. It is yet too soon to give exact percentages of the relative growth of the urban and rural districts, but what figures have been given show a most marked increase in city populations.

The population of England and Wales is now 32,525,816, of Ireland 4,456,546, and of Scotland 4,471,957, making a total population for the United Kingdom of 41,454,219.

POPULATION OF AUSTRALIA AND NEW ZEALAND

THE recent census of Australia, according to cabled reports, shows that the population of this great confederation has increased about 16.9 per cent in the last ten years, or 514,000 in round numbers, which exceeds the rate of growth of England, but falls much behind that of the United States. The present population of the island continent is 4,550,651 as against 4,036,570 in 1891. Apparently the Australians are spreading out more, for all the cities except Sydney show a less comparative increase than the country districts. Melbourne, for instance, since 1891 has added only 3,000 to her inhabitants and now numbers 493,956. Sydney ten years ago had a population of about 385,000, but the city has grown very rapidly and now is only a few thousand behind Melbourne. Victoria has given way to New South Wales as the most populous colony, though the former is still the most densely populated. Victoria has a present population of about 1,196,000, and New South Wales of 1,362,232.

New Zealand has added 146,000 white persons to her population, so that today there are 773,000 white people within her borders. Her rate of growth for the preceding decade is thus 23 per cent, which would tend to show that her radical social laws attract immigrants, notwithstanding the very high *per capita* debt of the government. Including the Maori, the population of New Zealand is 816,000.

THE CENTER OF POPULATION OF THE UNITED STATES

A POINT in the interior of the earth 600 miles beneath the city of Nashville, Tenn., has been computed by Mr. Henry Gannett as approximately the center of population of the United States and its dependencies, including Alaska, Cuba, Porto Rico, and the Philippines. In other words, the center is beneath the intersection of the 36th parallel with the 87th meridian.

In computing this center of population it is necessary to regard the earth as a sphere rather than a plane surface, for Porto Rico and the Philippines are nearly half the earth's circumference apart.

But if Alaska and the recent territorial acquisitions be disregarded, the center of population of the United States is six miles southeast of Columbus, in Bartholomew County, Indiana. In the ten years preceding June 1, 1900, the center of population has thus moved westward 14 miles and southward two and one-half miles, the smallest movement ever noted by the Census Bureau.

It shows the population of the Western States has not increased as rapidly as in former decades. The southward movement is due largely to the great increase in the population of Indian Territory, Oklahoma, and Texas, and the decreased westward movement to the large increase in the population of the North Atlantic States.

The center of area of the United States, excluding Alaska and Hawaii and other recent accessions, is in northern Kansas. The center of population, therefore, is about three-fourths of a degree south and more than 13 degrees east of the center of area.

SERVIA

THE little kingdom of Servia, the actions of whose monarch and his consort have aroused so much comment during the past year, is about the size of the States of New Hampshire and Vermont combined. Surrounded on all sides by foes or unreliable friends—Bulgaria on the east, Turkey on the south, Roumania and Austro-Hungary on the north and west—its life since it became a semi-independent nation has been a

hard one, especially as it has not known how to protect itself against attacks which its own deceitful arrogance has aroused.

The country is mountainous and hilly, without any of the mountains, however, attaining great height. Mt. Midzur, on the eastern boundary, with a height of 7,106 feet, overtops all others in the kingdom. The mountains of Servia are the ramifications of four systems which invade the kingdom from different directions. One branch comes from the east from Bulgaria, a second from the southeast from Macedonia, a third from the south from Albania, and the fourth from the west from Montenegro. Rivers, streams, and rivulets, all flowing in different directions, still further subdivide the country, but between the mountains and along the large rivers are rich and fertile sloping valleys and plains. Two and one-quarter millions of people cultivate all the available land. Servia is distinctly an agricultural country; 83.6 per cent of her people till the soil, and about 85 per cent in value of her exports are cattle and agricultural products.

The climate is temperate and dependent on the winds, which, on the whole, are constant from the northwest and northeast during the winter and from the west and southwest during summer. A temperature of about 25.2° Fahr. during winter and 69.98° during summer is the normal.

Twenty-five years ago, in 1876, Servia was clothed with forests, and was aptly termed "the land of the forest;" but the Servian-Turco trouble of 1876'–78 played havoc with the forests. Thousands of acres were stripped of trees in order to serve for fortifications or to bar the advance of the Turkish army or to warm the great masses of troops that camped on the land during two winters. The war was followed by a period of ruthless destruction of the forests, vast tracts being sold at a ridiculous price or denuded to supply the railroads.

GEOGRAPHIC NAMES

THE following decisions were made by the U. S. Board on Geographic names May 1, 1901:

Goose; point, Chincoteague Bay, Worcester County, Maryland (not Clam).

Hardship; branch of Pocomoke River, Worcester County, Maryland (not Hardshift).

Long; point, Chincoteague Bay, Accomac County, Virginia (not Bodkin).

Nofat; mountain between Buncombe and Madison counties, North Carolina (not No Fat nor No-fat).

Ricks; point, Chincoteague Bay, Worcester County, Maryland (not Rich, Rich's, nor Rick's).

Robin; creek and marsh, Chincoteague Bay, Worcester County, Maryland (not Robbins, Robins, nor Robin's).

Rockawalking; creek, post-office, and railroad station, Wicomico County, Maryland (not Rock-a-walkin).

Scarboro; creek and railroad station, Worcester County, Maryland (not Scarborough's).

Seeley; creek, Sauk County, Wisconsin (not Seely).

*Smoke; creek, south of Buffalo, Erie County, New York (not Smokes).

Taylorville; village, Worcester County, Maryland (not Taylor nor Taylorsville).

Tilhance; creek, Berkeley County, West Virginia (not Tilahanchee, Tilchancos, Tilehance, Tillehances, etc.).

Whittington; point, Chincoteague Bay, Worcester County, Maryland (not Willington's).

PREHISTORIC SURGERY

AN item going the rounds of the press relates to the Muñiz collection of trephined crania from Peru, exhibited at the Pan-American Exposition by W J

*Erroneously given in May number of this Magazine, p. 201, as in Pennsylvania.

McGee. The collection comprises 19 crania, of which several were trephined more than once. The trephined skulls were selected from a collection of 1,000 made by the late Dr. Manuel A. Muñiz in pre-Columbian, and probably pre-Incan, cemeteries in different portions of Peru; and they are of interest as showing that this major surgical operation was more common among the aborigines of South America than in the most highly advanced nations of today.

The ratio of trephined crania is just below two per cent; but since one specimen shows three operations and two others three each, the ratio of trephining to population indicated by the collection is nearly two and one-half per cent. The technic of the operation was critically studied by McGee, and described in a recent report of the Bureau of American Ethnology. It would appear from his researches that the operation was not therapeutic in the ordinary sense of the term, but was thaumaturgic and closely allied to the so-called "medicine" of various tribes, in which the treatment consists of occult ceremonies and skillful jugglery by the shamans.

UNEXPLORED CANADA

ONE-THIRD of the area of Canada is practically unknown, states the Director of the Geological Survey of the Dominion in his last report.

There are more than 1,250,000 square miles of unexplored lands in Canada. The entire area of the Dominion is computed at 3,450,257 square miles; consequently one-third of this country has yet been untraveled by the explorer. Exclusive of the inhospitable detached Arctic portions, 954,000 square miles is for all practical purposes entirely unknown.

Most of this unknown area is distributed in the western half of the Dominion in impenetrated blocks of from 25,000 to 100,000 square miles—that is, areas as large as the States of Ohio, Kansas, or New England are yet a secret to white man.

Beginning at the extreme northwest of the Dominion, the first of these areas is between the eastern boundary of Alaska, the Porcupine River, and the Arctic coast, about 9,500 square miles in extent, or somewhat smaller than Belgium, and lying entirely within the Arctic Circle. The next is west of the Lewes and Yukon Rivers and extends to the boundary of Alaska. Until last year 32,000 square miles in this area were unexplored, but a part has since been traveled. A third area of 27,000 square miles—nearly twice as large as Scotland—lies between the Lewes, Pelly, and Stikine Rivers. Between the Pelly and Mackenzie Rivers is another large tract of 100,000 square miles, or about double the size of England. It includes nearly 600 miles of the main Rocky Mountain range. An unexplored area of 50,000 square miles is found between Great Bear Lake and the Arctic coast, being nearly all to the north of the Arctic Circle.

Nearly as large as Portugal is another tract between Great Bear Lake, the Mackenzie River, and the western part of Great Slave Lake, in all 35,000 square miles. Lying between Stikine and Laird Rivers to the north and the Skeena and Peace Rivers to the south is an area of 81,000 square miles, which, except for a recent visit by a field party, is quite unexplored. Of the 35,000 square miles southeast of Athabasca Lake, little is known, except that it has been crossed by a field party en route to Fort Churchill. East of the Coppermine River and west of Bathurst Inlet lies 7,500 miles of unexplored land, which may be compared to half the size of Switzerland. Eastward from this, lying between the Arctic coast and Blacks River, is an area of 31,000 square miles, or about

equal to Ireland. Much larger than Great Britain and Ireland, and embracing 178,000 square miles, is the region bounded by Blacks River, Great Slave Lake, Athabasca Lake, Hatchet and Reindeer Lakes, Churchill River, and the west coast of Hudson Bay. This country includes the barren grounds of the continent. Mr. J. B. Tyrell recently struck through this country on his trip to Fort Churchill, on the Churchill River, but could only make a preliminary exploration. On the south coast of Hudson Bay, between the Severn and Attawapishkat Rivers, is an area 22,000 square miles in extent, or larger than Nova Scotia, and lying between Trout Lake, Lac Seul, and the Albany River is another 15,000 square miles of unexplored land. South and east of James Bay and nearer to large centers of population than any other unexplored region is a tract of 35,000 square miles, which may be compared in size to Portugal.

The most easterly area is the greatest of all. It comprises almost the entire interior of the Labrador Peninsula or Northwest Territory, in all 289,000 square miles, or more than twice as much as Great Britain and Ireland. Two or three years ago Mr. A. P. Lowe made a line of exploration and survey into the interior of this vast region, and the same gentleman also traveled inland up the Hamilton River, but with these exceptions the country may be regarded as practically unexplored.

The Arctic islands will add an area of several hundred thousand square miles of unexplored land.

The government during the past year has made a great effort in the direction of exploring and developing this vast territory. It has recognized the fact that railroads are essential to the development of a new country, and liberal inducements for their construction are made by granting millions of acres of land as a bonus.

GEOGRAPHIC PROGRESS IN SOUTH AMERICA

THE governments of the South American Republics are beginning to make an effort to obtain a better knowledge of their vast territories. One hundred years ago South America, next to Europe, was the most accurately known of the continents. Today it is the least known of them all, so rapid has been geographic progress elsewhere and so tardy in South America.

The government of Bolivia has recently taken steps to obtain a complete survey of the country. A Paris firm has engaged to immediately survey and map 40,000 square kilometers and to lay off a triangulation which will enable a complete trigonometrical survey of the country to be made. Bolivia has also arranged with Paraguay for a joint commission to trace and mark the boundary between the two nations. A joint commission with Brazil several months ago commenced surveying the Bolivian-Brazilian line. A school of mines has also been established by the Bolivian Government to train and encourage its own people to the development of its mineral resources.

COMMERCIAL RELATIONS OF THE UNITED STATES

THE Bureau of Foreign Commerce of the Department of State has issued its report on the commercial relations of the United States for 1900. The introduction, by the chief of the Bureau, Frederic Emory, contains several pertinent pages on the present ascendency of the United States:

"Lord Rosebery is quoted by cable as having said in a speech before a British chamber of commerce January 16, 1901, that the chief rivals to be feared by Great Britain 'are America and Germany. The alertness of the Americans,' he continued, 'their incalculable natural

resources, their acuteness, their enterprise, their vast population, which will in all probability within the next twenty years reach 100,000,000, make them very formidable competitors with ourselves. And with the Germans, their slow, but sure, persistency, their scientific methods, and their conquering spirit, devoted as these qualities are at this moment to preparation for trade warfare, make them also, in my judgment, little less redoubtable than the Americans. There is one feature of the American competition which seems to me especially formidable, and as I have not seen it largely noticed, perhaps you will excuse me for calling attention to it. We are daily reminded of the gigantic fortunes which are accumulated in America, fortunes to which nothing in this country bears any relation whatever, and which in themselves constitute an enormous commercial force. The Americans, as it appears, are scarcely satisfied with these individual fortunes, but use them, by combination in trusts, to make a capital and a power which, wielded as it is by one or two minds, is almost irresistible, and that, as it seems to me, if concentrated upon Great Britain as an engine in the trade warfare is a danger which we cannot affore to disregard. Suppose a trust of many millions, of a few men combined so to compete with any trade in this country by underselling all its products, even at a considerable loss to themselves, and we can see in that what are the possibilities of the commercial outcome of the immediate future.'

"It has been evident for some time that the United States, not content with having solved that part of the problem of economy of production which relates to processes of manufacture and the utilization of labor, has been drifting instinctively toward the larger question of the concentration of capital as the logical development of the same general idea of reducing cost and increasing the margin of profit. The question is larger because it has a more direct and more general bearing upon the economic and social life of the nation; upon the interests, real or imagined, of the whole body politic. We have to do with it here only because of its relation to and possible effect upon our foreign trade, and it is interesting to know that so thoughtful an observer as Lord Rosebery perceives in the simplification of the use of capital in the United States which is going on—it may be said experimentally, to a large extent, as yet—a tremendous power in the commercial rivalry of the world.

"Germany, as well as Great Britain, seems fully sensible of the seriousness of American competition. In a recent issue the *Hamburger Fremdenblatt* points out that the United States, which ten years ago exported more than 80 per cent of agricultural products and less than a fifth of manufactured goods, todaydraws nearly a third of its entire export from the products of its factories. 'In other words, the Union is marching with gigantic strides toward conversion from an agricultural to an industrial nation.' Does not the rapid increase of the United States in the value of industrial exports, the *Fremdenblatt* asks, 'constitute an imminent danger for all competing nations?'

"The *Fremdenblatt's* conclusion is that Europe 'must fight Americanism with its own methods; the battle must be fought with their weapons, and wherever possible their weapons must be bettered and improved by us; or, to speak with other and more practical words, Germany—Europe—must adopt improved and progressive methods in every department of industry, must use more and more effective machinery. Manufacturers as well as merchants must go to America, send thither their assistants and workingmen, not merely to superficially observe the methods there employed, but to study them thor-

oughly, to adopt them, and, wherever possible, to improve upon them, just as the Americans have done and are still doing in Europe."

The following table shows the imports and exports for 1900 of all countries for which statistics have been received by the Bureau of Foreign Commerce:

	Imports.	Exports.
United States	$829,052,000	$1,478,050,000
United Kingdom	2,548,260,000	1,725,422,000
Germany	1,388,328,200	1,084,159,200
France (11 months)	773,058,600	719,686,600
Belgium	409,139,500	346,808,100
Austria-Hungary (9 mos.)	280,887,200	317,954,200
Spain (11 months)	123,181,100	101,868,500
Servia (9 months)	7,687,000	8,778,900
Russia (8 months)	119,110,200	210,807,000
Switzerland	214,800,000	164,000,000
Italy (11 months)	275,792,300	237,367,100
Greece (3 months)	5,690,700	3,894,900
Mexico (1896–1900)	61,304,900	71,396,600
Canada (1899–1900)	182,951,400	175,656,900
British India (1899–1900)	293,345,200	374,163,900
British Guiana (1899–1900)	6,329,800	9,254,200
Cuba (1899–1900)	71,681,200	45,228,300
Philippines (1899–1900)	20,597,200	19,751,100
Porto Rico (10 months ended April, 1900)	8,730,600	4,594,400
Japan (10 months)	124,261,200	81,146,800
Egypt (10 months)	54,029,100	60,350,900
French Guiana (6 months)	1,648,800	1,388,300

U. S. GEOLOGICAL SURVEY

THE U. S. Geological Survey has assigned the following field parties for work during this season:

Arizona: T. A. Jaggar, Waldemar Lindgren, J. M. Boutwell, F. L. Ransome, John D. Irving, and R. T. Hill.

Arkansas: George I. Adams.

California: George F. Becker, W. Lindgren, J. C. Branner, J. S. Diller, Geo. H. Eldridge, and H. W. Turner.

Colorado: C. W. Cross, Ernest Howe, J. Morgan Clements, S. F. Emmons, John D. Irving, and George I. Adams.

Connecticut: William H. Hobbs and H. E. Gregory.

Delaware: R. D. Salisbury and George B. Shattuck.

Georgia: Arthur Keith.

Idaho: Bailey Willis.

Indiana: George H. Ashley.

Indian Territory: J. A. Taff and George I. Adams.

Kansas: W. S. Tangier-Smith.

Kentucky: M. R. Campbell and George H. Ashley.

Louisiana: George I. Adams.

Maryland: Continuation of cooperative work as in previous years; William B. Clark, E. B. Matthews, and George B. Shattuck; study of ancient crystalline rocks, paleozoic stratigraphy, and coastal plain deposits.

Massachusetts: B. K. Emerson.

Michigan: Frank Leverett, F. B. Taylor, C. R. Van Hise, C. K. Leith, and W. S. Bayley.

Minnesota: C. R. Van Hise and J. Morgan Clements.

Missouri: W. S. Tangier-Smith.

Montana: Continuation of special studies in the Rocky Mountains; Charles D. Walcott, director; W. E. Weed, and Bailey Willis.

Nevada: G. K. Gilbert.

New Jersey: R. D. Salisbury and George B. Shattuck.

New Mexico: George H. Girty, R. T. Hill, and C. W. Cross.

New York: L. C. Glenn, T. N. Dale, and J. F. Kemp.

North Carolina: Arthur Keith.

North Dakota: N. H. Darton and C. M. Hall.

Ohio: Charles S. Prosser.

Oklahoma: J. A. Taff.

Oregon: J. S. Diller.

Pennsylvania: Parts of Butler, Armstrong, Indiana, Washington, Westmoreland, Fayette, and Tioga Counties, M. R. Campbell, A. C. Spencer, George B. Richardson, and L. Fuller; northern Pennsylvania, George H. Girty; Philadelphia and vicinity, Prof. Florence Bascom and C. R. Van Hise; refractory clays of Pennsylvania, C. W. Hayes; Fulton and Franklin counties, George W. Stone; coal measures, C. D. White.

South Carolina: Arthur Keith.

South Dakota: N. H. Darton and J. E. Todd.

Tennessee: Arthur Keith.

Texas: R. T. Hill and George I. Adams.

Utah: G. K. Gilbert.

Vermont: T. N. Dale and J. E. Wolff.

Washington: F. L. Ransome and Geo. Otis Smith.

West Virginia: Coöperation with State survey under Prof. I. C. White; Wayne county, M. R. Campbell, survey of Ceredo quadrangle.

Wisconsin: C. R. Van Hise and W. C. Alden.

Wyoming: W. C. Knight, N. H. Darton, George I. Adams, and Arnold Hague.

Dr. Gregory, who was to have had charge of the scientific work of the British South Polar Expedition, has resigned his connection with the expedition. Friction between the naval and scientific staffs is believed to be the cause of his withdrawal.

Gen. A. W. Greely, Chief Signal Officer U. S. Army, will make a general inspection of the signal service in the Philippine Islands during the present season. The larger islands of the archipelago are now connected by cable, and each has a telegraph system which includes most of the larger towns.

The U. S. Biological Survey will this summer continue the study of the geographic distribution of animals and plants in Texas. The Survey has been engaged in the work for several years, and in due time will issue maps showing the life zones and faunal areas in the State. Mr. Vernon Bailey has charge of the work and has already begun field operations in southwestern Texas.

Exploration of the Sea.—A meeting of representatives of all the countries bordering on the Baltic and North Seas, excepting France, was recently held in Christiania to confer on the programme for the exploration of the seas between Greenland, Iceland, and Norway. Each of these nations will have a special section assigned to it for study, so that a complete knowledge of the currents, sea bottoms, etc , may be soon obtained. The Norwegians and Russians have already equipped special steamers to carry out their share of the work, and work on the German vessel which is building for the same purpose is well advanced.

The Bureau of American Republics has published two handsome maps of Mexico on the scale of 50 miles to the inch. The first map, besides being a general map of the country, by colors shows the elevation of every part of the Republic. It also gives the agricultural features, showing what sections are wheat-growing, what are favorable to the great Mexican staple henequen, etc. The second map shows the distribution of minerals throughout the country as far as prospecting has revealed their location. These maps are the result of much research, combining all the results of latest surveys. The Bureau announces that similar maps of all the Central and South American Republics are in course of preparation. The map of Brazil is nearly completed, and work on the maps of Guatemala and Costa Rica well advanced.

The Royal Geographical Society has this year awarded the Founders' medal to the Duke of Abruzzi for his two feats of being the first to ascend Mt. St. Elias and of gaining what is now "farthest north," 86° 33′. The expense of each of these expeditions was borne mainly by the Duke, though his uncle, the late King Humbert, generously aided him. The Society has awarded the Patrons' medal to Dr. A. Donaldson Smith for his explorations in Central East Africa in 1894–'95 and 1898–1900. Dr. Smith traversed the last densely inhabited area remaining unexplored in Africa—the country between Lake Rudolf and the White Nile. Awards have

also been made by the Society to Captain Cagni, of the Duke of Abruzzi's party, and to Mr. L. Bernacchi and Captain Colbeck for aid in Borchgrevink's South Polar Expedition. King Edward VII has succeeded Queen Victoria as Patron of the Society.

Philippine Weather Service.—The Philippine weather service has now scattered throughout the archipelago some 20 telegraphic stations from which advance warnings of the approach of typhoons can be wired to Manila. Before the revolution of 1897 Spain had a number of similar stations located at strategic points, but when Dewey entered Manila Bay not one remained outside of the city. After the occupation of the islands by the American Government plans were at once formed by the Chief of the U. S. Weather Bureau, aided by Father Joseph Algué, S. J., to reorganize and extend the former service, and now that the pacification of the islands is nearly secured, these plans are rapidly becoming realized. The Philippine service is in charge of the Manila Observatory, with Father Algué as director. It is supported by the funds of the Philippine Government rather than those of the United States, and is independent of the U. S. Weather Bureau, but receives the active coöperation and assistance of the latter. As soon as enough of the islands have been connected by cables the U. S. Government will organize an extensive system, and the Philippine service will be incorporated under Federal direction.

GEOGRAPHIC LITERATURE

Report of the Chief of the Weather Bureau, 1899-1900. U. S. Department of Agriculture. Pp. 436. 1901.

Prof. Willis L. Moore gives a comprehensive statement of one year's work of this great scientific branch of the Government. During the year many important advances were made. A station established at Turks Island completed the chain of stations extending from the Lesser Antilles northwestward to Bermuda and the southeastern coast of the United States. Plans were formed, and have since been realized, for special storm forecasts for the North Atlantic Ocean, giving the wind force and wind direction for the first three days of the route of all outgoing steamers. Experiments were made in wireless telegraphy, and eminently satisfactory progress made in the investigation. A reduction to a homogeneous system of the barometric observations taken by the service during the past 30 years was undertaken. The total eclipse of May 28, 1900, was observed by Professors Bigelow and Abbe, at Newberry, S. C., and new information (to be published later) obtained regarding the effect of solar action upon the earth's atmosphere. Arrangements for distributing forecasts and warnings to vessels navigating the Great Lakes were so perfected that each of the 20,000 vessels that passed Detroit received the latest weather news, and also vessels leaving Chicago and the Great Lake ports. Forecasts of cold waves, of hurricanes, and of floods saved millions of property.

A valuable feature of the report are tables, prepared by Prof. A. J. Henry, giving the monthly mean, maximum, and minimum temperature, pressure, and moisture of 170 Weather Bureau stations. The meteorological observations of Evelyn B. Baldwin during the Wellman Arctic Expedition of 1898–'99 complete the report.

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CONTENTS

THE LINK RELATIONS OF SOUTHWESTERN ASIA PAGE
BY TALCOTT WILLIAMS, LL. D. ILLUSTRATED 249

CHINA: HER HISTORY AND DEVELOPMENT. BY JOHN BARRETT, FORMERLY MINISTER TO SIAM 266

THE INDIAN VILLAGE OF BAUM 272

THE GEOGRAPHY OF ABYSSINIA 274

OIL FIELDS OF TEXAS AND CALIFORNIA 276

THE SERI INDIANS 278

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Statistician of the U. S. Department of Agriculture

Managing Editor: GILBERT H. GROSVENOR

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE LINK RELATIONS OF SOUTHWESTERN ASIA*

BY TALCOTT WILLIAMS, LL. D.

IN history a vast literature exists on southwestern Asia, the one region of the world's surface whose written record is oldest, most continuous, and most full. The physical features of the region have had a discussion less full, but almost as long. In southwestern Asia the arc of the celestial sphere was first applied to the measurement of the earth's surface. There first the sign, the hour, the degree, the minute, and the second were devised. There the earliest maps were made. There the first geographical record was inscribed. Our entire knowledge of the earlier distribution of man upon the earth and of the condition in which he found its earlier physical features, when his conscious life first woke to their impression, influence, and effect, rests upon the records of clay, in stone, and on papyrus of the river valleys of southwestern Asia and its linked regions. I propose, however, to consider alone neither the history nor the physical conditions of this tract, but to endeavor to show the interrelation between the two, the causes which have made this part of the earth's surface prolific in history, the guiding principle which in every age has determined the course of these annals, and the fashion in which in our own time a problem which began at the very dawn of human annals is receiving its final solution.

THE ASIAN COAST-LINE

In dealing with any continent it is well for us to orient ourselves by considering in their simplest relation its area and coast-line. If the area of each of the continents be represented by a circle which gives its relative extent contained in the smallest possible form, and outside of this we draw another circle, giving the length of the sides of its extremely irregular reëntrant polygon,[1] we have presented to us graphically the relative access which the continents enjoy from the sea—an access which constitutes the great source of perturbing influence, so far as the inhabitants of each continent are concerned. If this ratio

[1] Development of Continental Coast Lines Relative to Area, Geog. Univ., Reclus, E., Europe.

*A lecture delivered before the National Geographic Society March 5, 1901.

is very large—and it is larger in the case of Europe than any other—the access of perturbing influence will be frequent ; if it is small the reverse will be true.[2]

Asia, largest in absolute area, stands midway with reference to the ratio which its coast-line bears to its area between the six great divisions into which the earth's surface is usually divided, three of which were known to the earliest geographers of the region of which we are treating—a region which stands at the junction of the three. The ratio is smaller than it is in the case of Europe or North America ; it is larger than that of Australia, Africa, or South America. *A priori*, therefore, we might simply, with these relations before us, if we were dealing with the affairs of an unknown planet of which we knew only the facts presented by these areas and circles, conclude that the most mobile conditions would exist in the continent named Europe ; that these would be shared by North America ; that the affairs of Asia would offer a mean between the extreme activity of Europe and the extreme immobility in the history and development of Australia. The problem which we have to consider with our larger knowledge is to determine the interaction which these varying relations of area and coast-line have created between the three contiguous continents with which we have to deal, whose natural mean term and link is southwestern Asia.

THE RED SEA RIFT

With the general characteristics of Asia you are already familiar. As I present to you the Eurasian continent,[3] you recognize instantly that its central core is that great east-and-west uplift whose western center is the Alps and whose eastern upheaval is the great boss of central Asia, too large to be designated by any one term. This great and continuous chain is crossed at right angles upon the earth's spheroid by that long drawn rift or gap which extends from the hollow valleys of Coele-Syria to Lake Tanganyika and beyond, to which attention was first called by Suess, and which has been more fully discussed by the English geographer, Mr. J. W. Gregory.[4] This range extends in its subordinate forms to the very edge of that other great rift—part of that circle of fire which rings the Pacific. Properly speaking, one might say there are three great lines of volcanic action : one old, which lies at right angles to the great Eurasian uplift, and which is in a condition which, in the case of a river, we should call its last stage ; one in its mid-stage of activity, extending parallel to it along the eastern coast of Asia, and a third, which appears,

[2] The figures as to the area of the continents are necessarily mere approximations. The following table gives the outline as presented by M. Elisée Reclus :

	Europe.	Asia.	Africa.	N. America.	S. America.	Australia.
Total area, square miles .	4,005,100	17,308,400	11,542,400	9,376,850	6,803,570	3,450,130
Mainland, square miles.	3,758,300	15,966,000	11,293,930	7,973,700	6,731,470	2,934,500
Development of coast-line, miles.	18,600	34,110	16,480	30,890	16,390	10,570
Accessible coasts.....	17,610	28,200	18,480	26,510	16,390	14,400
Ratio of the geometrical to the actual contour .	1 : 2.5	1 : 2.5	1 : 1.4	1 : 3.1	1 : 1.8	1 : 1.7

[3] Relief Sketch Map of Eurasia, Lambert's Projection, Butler's School Geographies.

[4] "Das Antlitz der Erde," Suess, Edouard, and "The Great Rift Valley," Gregory, J. W., 1896.

Relief Sketch Map of Eurasia — Lambert's Projection

Courtesy of Messrs Butler and Sheldon

though one cannot say certainly, not to have yet reached its maximum of activity, but in an area like that crowded volcanic region in Central America, to be still in what one might call the torrent stage of a river. The great east-and-west line which divides Asia has to the north great plains, but recently (speaking in a geologic sense) submerged, and to the south groups of river valleys, which, in the case of the Indo-Asian, the Indian, and the Euphrates Valley, abut on more southern regions of an older type and now wholly or partially submerged. Asia has, in short, an abrupt scarp to the south, a sloping desert plain to the north, and the greatest of earth's mountains between.

THE DISTRIBUTION OF CITIES

This area presents itself to us as divided into countries settled and inhabited. Broad tracts there are to the north almost without population, but the unconscious impression which we have in regard to Asia is, as with most parts of the earth's surface where men exist, of a uniform film of population spread over the entire region, not greatly differentiated. But the test of organized population is the existence of cities. The presence or absence of cities measures not only the density of population, but the extent to which population is organized in society. From a map of this region [5] indicating cities of over 50,000 population, the smaller dots indicating cities of this size and the largest going up to cities of 1,000,000 population, it is apparent that the city population of the Eurasian area is centered in three distinct groups. These lie in the two river systems of China, in north India, principally on the Ganges, and in the western

[5] "Villes sur la Surface du Globe," Almanach Hachette, 1900, p. 293. This map has, as most will see, another origin, but I have referred to the form in which I found it most suitable for reproduction.

part of Europe. China is throughout a thickly populated country, but its greater cities are drawn toward the coast and lie principally in a crescent-shaped mass from the mouth of the Hoang-ho to the mouth of the Si-kiang. In the same way the cities of India crowd into the valley of the Ganges, and the great bulk of the city population of Europe lies in the narrow ellipse of which Berlin and London are the two foci.

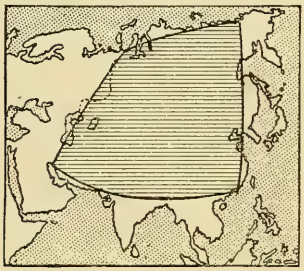
THREE ORGANIZED AREAS

The area which we are considering, therefore, instead of being one of a general and indiscriminate population, is differentiated into three masses, into cities far apart on the east, the west, and the south of the Eurasian mass. The history of the world for many thousand years has been the history of the interaction of these three great masses of city population. Each demands in part what only the other two can furnish. For each of the three great masses, as in all economic integers, prosperity rests not merely upon the continuous and symmetrical development of internal resources, but also and still more upon that narrow margin of advance and profit which comes from advantageous exchange. When these three masses of population, which early formed themselves into cities—for the present cities of northern Europe are the direct descendants of a similar ellipse of cities along the Mediterranean and which still have their representatives there—enjoy a full, unbroken exchange, these three groups are prosperous. When an interruption occurs in this exchange, there come, in any one of the three which is in a position most to feel the interruption, economic depression, disaster, revolution, extending perhaps to a social cataclysm. This often arises not because interruption of free intercourse between these three great groups of cities would alone have caused catastrophe, but because when many other causes of an internal character had combined to weaken the social fabric, the shock which came by the loss of this profit was sufficient to destroy unstable equilibrium and to bring a sudden ruin which otherwise would have gone through a normal degeneration and deterioration. So far as these groups appear on an ordinary map, communication appears easy. A broad extent of land connects all three, and the ordinary impression is one of connection, and not separation, between the different parts of this great land mass.

THE CORE OF ASIA

These city groups lie outside the main core of the continent. If the rude trapezium which can be inscribed within the continental mass of Asia be drawn

upon its surface, as in the accompanying diagram[6], the city regions lie outside of this great central mass. This is true of both the earlier lines of cities which stretch from Ctesiphon to Italica, of the present group in northern Europe, and of the more modern group which extends from Moscow to Manchester, of the cities of India, and of the cities of China. In fact, if the eastern line bounding the continental core of Asia be drawn from the head of the Gulf of



The Continental Core of Asia

Courtesy of Messrs. D. Appleton & Co.

Tonkin to the head of the Gulf of Pechi-li, the entire city area of China will lie to the east of this line. It is true, therefore, of the highly organized parts of the Asiatic continent that its 1,500,000 square miles of mainland all lie outside of the great land mass. The space within the central core, which amounts in all to between 12,000,000 and 13,000,000 square miles, is a great region, which, as it stretches before us on the map, is seen to be without history, without product, without letters, and without art. Within this vast area one-fifth of the world's surface, whose history began early, over which men have moved through all the annals of man, there is no spot where any book has been produced which men cherish; thence has come no painting or statue which men admire. There is no lack in this area of battle, murder, and sudden death; of the noise of the captains and the shouting; of garments rolled in blood, and all the uproar of siege and sack. But as we remember its wars, they seem to us, however wide our historical knowledge, as fought

> On a darkling plain,
> Swept with confused alarms of struggle and flight,
> Where ignorant armies clash by night.

ASIA'S ARID CLOSED BASIN

One reason why this main core is without history is because in larger part it consists of a closed basin, the largest on the earth's surface.[7] This closed basin, whose irregular outlines bound the great sea which once matched the Mediterranean and extended in a great L-shape projection[8] to the Arctic Ocean, along the low trough in which the Obi runs, and which constitutes the real division between Asia and Europe, rather than the Ural Mountains, is divided into two portions by the Kuen-lun range, the southern and elevated plateau from 12,000 to 15,000 feet high; the northern, lower, but still having an average elevation of 5,000 or 6,000 feet, extending to the low watershed which divides the series of rivers that flow toward the Arctic from the group of lakes that extends across Asia. This area is, in the first place, closed; this cuts it off from the sea. The sea-flowing river leads to the sea, and the sea leads the world around. Still more; this is not only a closed basin; it is a closed basin because it is arid; for wherever there is sufficient rainfall, an inner basin (as has been the case with several on our own continent) is certain

[6] "The Continental Core of Asia," International Geography, Mill, Hugh Robert, 1900, p. 423.

[7] Arid Regions, Enclosed Basins; "Earth and Its Inhabitants;" Asia; I, p. 11. Reclus, E. 1884.

[8] The Natural Boundary of Europe; "Earth, &c.;" Europe; I, p. 11. Reclus, E.

Arid Regions and Closed Basin of Asia

Courtesy of Messrs. D. Appleton & Co.

to establish connection with the sea. The streams on one side or the other eat back through the watershed, "steal" the source of an earlier and less vigorous stream, and bring about that continuous drainage across the previous dividing line which is the mark of so much of our Appalachian region. Nothing of this kind has happened with this closed basin, which from the earliest history has remained closed. The greater streams of Asia, like the Indus and the Ganges, have eaten longitudinally in the folds of the great system in which they sprang, and have not cut across the watershed. The different conditions of China from those of India appear in large measure due, however, to a somewhat different action of the streams there, though this awaits further investigation. The great curve of the Hoang-Ho and sundry conditions of the upper Yangtze Kiang indicate the coalescence of valleys previously separate.

The eastern part of this enclosed area, the Great Plain of Turkestan, extends to a level below the surface of the ocean; but all the three parts, the elevated plateau of Tibet, the less elevated area of Chinese Turkestan, and the plains of the Khanates, constitute together a great block interfering with free communication between the two city centers of Asia and the successive city centers of Europe, first south and then north of the Alps. Over all this area a dense population has never been possible. Only at points where irrigation is feasible has the population ever reached a high degree of civilization in tracts essentially insular in their character, cut off by oceans of desert, and able to develop insular cultures in the midst of a continental area. Two great highways extend across this enclosed basin. Of the two areas on each side which are open to the ocean, connecting the Eurasian centers of population, the one to the north is closed by cold.

THE LINK REGION

There remains, therefore, in the great land stretch which apparently connects the different civilizations of the Eurasian system only the narrow strip of ocean-drained lands which extends from the Indus to Asia Minor. This constitutes the natural highway of the Eurasian system. It is the link land of the continent. Its history has had an internal development. Its external relations, however, the growth of its dynasties, the course of its culture, the development of its wealth, and the channels of its trade have throughout this entire region—

The Mediterranean Basin

Courtesy of Messrs. D. Appleton & Co.

which on our maps today is covered by Afghanistan, Baluchistan, and the Persian and Turkish Empires—been governed by its position as a narrow causeway between the populations which grew up in the river basins of China and India and the populations which developed on European islands and peninsulas, large and small, old and new, from the days of the Phœnician galley to the days of the English tramp steamer.

The primal basal fact in regard to any part of the earth's surface, the fact which conditions all the rest and inexorably determines and defines human development, history, and civilization, is whether it partakes in its coast line of the Atlantic or Pacific Coast type. The first type, now a familiar commonplace in geography, is represented by coasts like those of the Atlantic, of which the eastern coast of North and South America is the standard, which show a minimum of change, constituting an even coast-line in which the hundred-fathom line through most of its course preserves so steadfast a distance from soundings that the position of a vessel can over most of this area be instantly, though approximately, determined by its discovery. Such a coast is continuous in its outline, quiescent in its mutations, unbroken in its development. To such a coast-line history can be transplanted. On such a coast-line history has never originated. The significant example of the Pacific type of coast, on the other hand, is represented by the western half of that rim of fire which girdles the Pacific and which gives the eastern coast of Asia its island continent and the successive volcanoes which appear at brief intervals from Krakatoa to the Arctic Circle. This type marks the true coast of Asia; on the east it exists in northern India, and reappears in one of its most characteristic forms on the northern edge of the Mediterranean. If we reproduce here a summary of the distribution of these types of coast,[9] it is immediately apparent that the coast of China, the region in north India in which its two great river valleys lie, and the Mediterranean region are connected by a narrow strip of such coast along the Persian Gulf and the Bay of Bengal of the same mobile type. On the other hand, the east coast of Africa, all the coast of Arabia, including that on the Red Sea, represent coasts of an

[9] Der Atlantischer und Stiller Ozean Typus.

immobile type, in which fluctuations of surface have long since reached a comparative equilibrium. Where the coast is mobile, changes in the coast constantly occur. There the coast will be irregular, and the approaching and penetrating sea will carry

Into every bare inlet and creek and bay

contact and the seeds of development. The northern coast of the Eurasian region is bounded by an immobile coastline, and its area for 2,000 miles inland is of a monotonous character, which renders communication or the diversification of type difficult. The development of any race comes where there is a diversity of physiographic conditions. It is therefore significant that the three city regions already noted are joined at only one point along southwestern Asia by a strip of territory under physiographic conditions similar to their own. This is, of course, only another way of saying that the Taurus, Caucasus, and other ranges of the region are part of that same new uplift which decides the northern outlines of the Mediterranean and fixes the sources of the great river systems of Asia. In its fundamental characteristics, therefore, this region partakes of those coast conditions which exist in the three regions of which it is a link. It is provided with mountain ranges of a similar structure, running in the same general direction, presenting the same general aspect, and furnishing, therefore, the soil for transmission of common ideas and a similar social structure.

RAINFALL AND DEVELOPMENT

Rainfall determines the limits of human development. The rainfall of the world extends from a precipitation of from three to five inches up to ten feet; but the limits of this rainfall within which any civilization is possible are narrow. They extend practically from

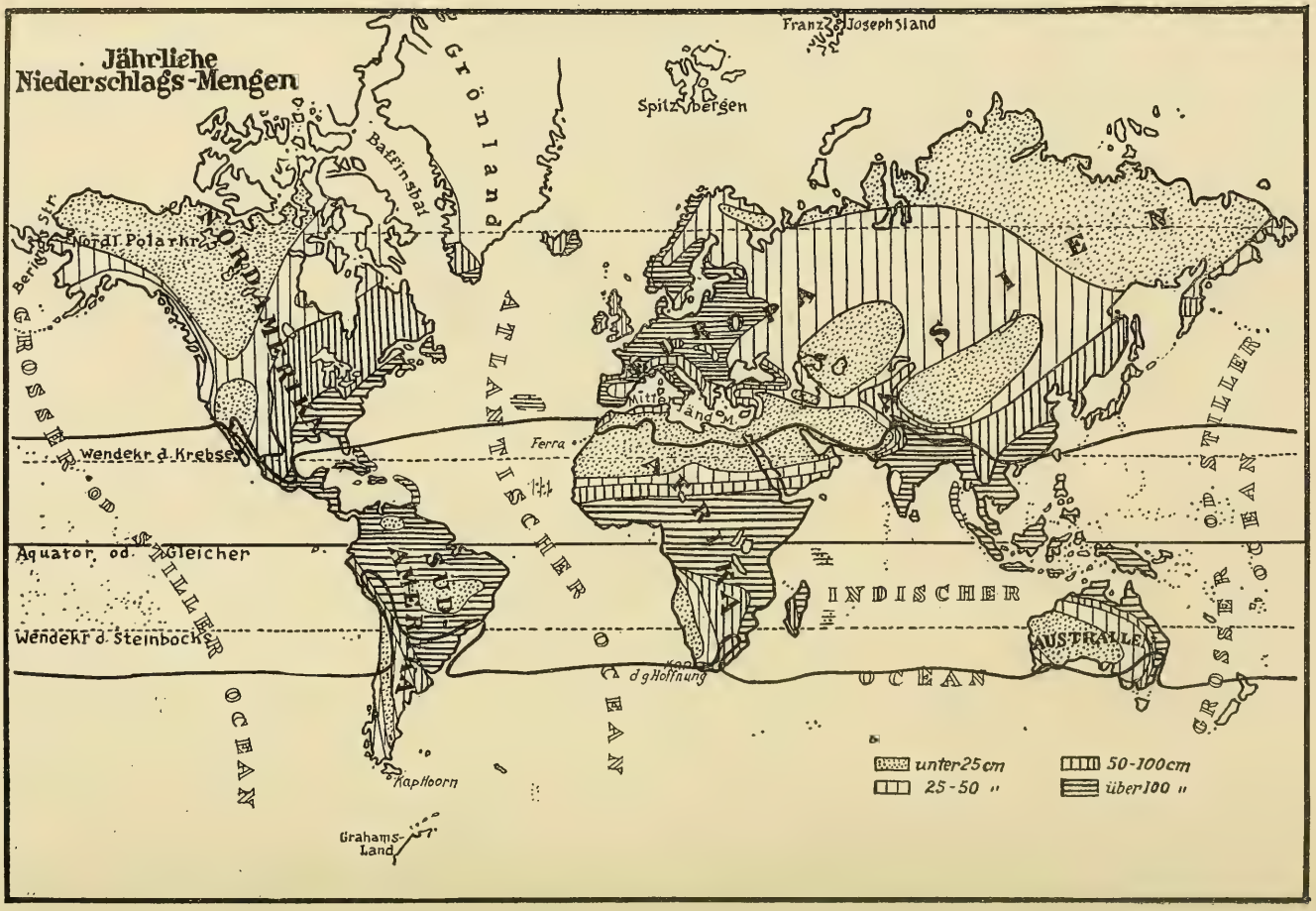
Map Showing Distribution of Atlantic and Pacific Coast Types

15 to 20 inches up to 45 or 50. With a rainfall of 50 inches few civilizations exist. With a rainfall of over 50 inches civilization is drowned out. A rainfall of less than 10 or 15 inches renders cultivation impossible unless irrigation is conducted on a large scale, and this involves either complete isolation from disturbance on the part of small communities or a share on the part of a small community in the security and capital of a larger nation, with sufficient resources to carry out an extensive project of irrigation. If, as in this map,[10] which presents rainfall, the average annual precipitation be distributed into a rainfall of under 25 centimeters, from 25 to 50 centimeters, from 50 to 100 centimeters, and over 100 centimeters, it will be seen that the civilized and developed regions of Asia and Europe have a rainfall of from 50 to 100 centimeters; but there lies between them a broad area of a rainfall of under 25 centimeters; and that the region which we have been considering has over it a strip of rainfall of 25 to 50 centimeters—a mean between the rainfall in which civilization is impossible and that under which it best flourishes. Where a rainfall as small as this falls over a broad tract of uniform modeling, it will be so distributed and diffused as to do little more than create brief green patches in the winter and spring. Where, however, it meets any medium mountain range creating valley areas, a rainfall of this character will be so collected as to give fertile river valleys essentially insular in their character, which will be sheltered from disturbing invasion by stretches around less easily traversed and in some respects, as in the desert west of Egypt, a greater protection than any ocean deep. Such a stretch of reduced rainfall over a mountain tract would constitute, therefore, another of the link conditions which unite the heavier precipitation under which civilization develops.

[10] Jahrliche Niederschlage Mengen in "Grundzuge Physischen Erdkunde," Supan, L., 1897, Taf. XI.

RAINFALL AND MOUNTAIN TRACTS

So far as precipitation is concerned, therefore, the three centers of the Eurasian system are separated by regions of insufficient rainfall north and south. Across these, just north of that high barometric area along the thirtieth parallel, which constitutes so important a climatic influence in the North Temperate Zone, stretches a region of medium rainfall for which the mountain system of southwestern Asia gives exactly the conditions which permit the early development of isolated civilizations in a region where the development of man is not impeded, as it is over the forest region which once stretched from the Pacific to the Atlantic across the Eurasian system or by the desert region to the south. At this point, therefore, the hypsometric conditions coöperate with the rainfall produced by the distribution of isobars and other causes to create in this linked region the opportunities, not for extensive and heavy population, but for nests and centers of population. Climate, which is rainfall plus place and temperature, enforces this condition still more clearly. The Mediterranean basin constitutes a distinct climatic region, separated on the one side from the steppe climate of eastern Europe and from the moderate climate, due to warm currents of air, in western Europe. India and the island world to the southeast constitute another climate, not unlike in its uniform conditions to the Mediterranean basin, though wholly unlike in its temperature and precipitation. This has to the north the steppe climate of central Asia and the climate of China, as with that of Europe, modified by air drifts. Between these two regions, as the distribution of climate by Supan shows, the mountain region, extending from the



Map Showing Distribution of Rainfall on Earth's Surface

Map Showing Climatic Divisions

1. West Europe
2. East Europe
3. West Siberia
4. East Siberia
5. Kamchatka
6. China and Japan
7. Asiatic Plateau
8. Aral
9. Indus
10. Iranic Plateau
11. Mediterranean
12. Sahara
13. Tropical Africa
14. Kalahari
15. Cape
16. East India
17. Australia
18. South West Australia
19. ———
20. New Zealand
21. Polynesia

valley of the Indus to the coasts of Asia Minor—a region decreasing in elevation as it passes from the mountainous uplift looking down upon the Indus to the plateau of Iranistan, and so on to the broken ranges in which the Tigris and Euphrates have their mountain origin—furnishes continuous climatic conditions. In its culture, the mountainous region has varied yet it has kept somewhat similar culture conditions, while the plain and rivers below, toward the Persian Gulf and the Indian Ocean, have as constantly furnished the development of commerce and cultivation. Considered with reference to climate, therefore, the region which we are considering again appears as a link region, lying between the climatic conditions which exist over the Sahara and Arabia and those which obtain in the Eurasian plains from the Vistula to the Asian uplift. Nor is it without its close connection with the various history that has there appeared that this region has in Asia Minor a climate at so many points closely resembling that of the high interior of Asia, so that from western Asia Minor to the north of eastern Tibet the same Turkish language may

be heard, the same tents seen, and the same tribal customs studied under the scattered and isolated conditions of nomadic life.

FLORA BOUNDING CULTURE REGIONS

The flora of a region, which is a blend of the influences of its physiography, its precipitation, and its climate, makes these relations still more clear. The flora also, since its limits define the bounds of agriculture, constitutes sharper boundaries for varying culture than are furnished by any other physical condition. While the climate and precipitation of the Mediterranean, the north African, and the southwestern Asian region vary, the same flora extends from the western flanks of the valley of the Indus to the Pillars of Hercules. Essentially the same flowering plants flourish from the southern edge of the Pyrenees, Alps, and the Julian chain to the southern edge of the Atlas, and the more favored Saharan oases. Substantially the same genera, with far smaller variations also in species than would be anticipated,

are to be found in the valleys of Morocco and Baluchistan, of Afghanistan and the Iberian peninsula. Over this entire region closely similar deciduous trees and annuals almost as similar flourish. Over them, consequently, the same agriculture is possible. As will be seen, in Supan's distribution of floral kingdoms, this floral region which abuts to the north in Europe on the flora of the great forest, of which so few remnants are left, between the North Sea and the Sea of Okhotsk, which touches on the east upon the flora of inner Asia, and which is flanked to the south by the typical flora of Africa, Madagascar, and India—at so many points furnishing the proof of an earlier connection—constitutes a connecting link in limitations of precipitation, climate, and vegetation which permit substantially similar human culture and ideals to exist over the entire area. Substantially within these limits were felt the influences of the earlier empires from the fourth to the first millennium before Christ. Within them swayed the refluent tides of the successive empires in the first millennium before and the first millennium after Christ, beginning with the Persian expansion and ending with that of Islam. This region, therefore, in which nearly all Eurasian fruits and so large a share of the food plants of civilization were first cultivated, in this respect is again seen to be a connecting link between the rice and wheat civilizations of Asia and the wheat civilizations of Europe.

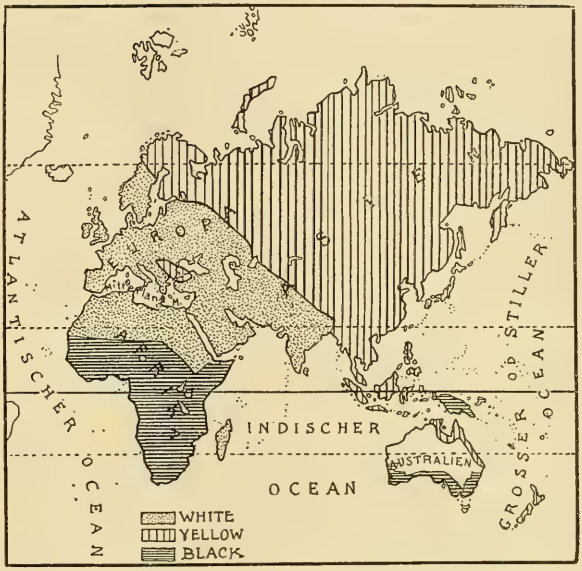
SOUTHWESTERN ASIA AS A DIKE

If we now collate these facts with reference to elevations and return again to the distribution of levels with which we began, it becomes plain that what we are really considering in these varying conditions is the fact that the Great Uplift is really, in the region which we are discussing, a narrow dike of mountains between the comparatively flat lands which extend from Arabia to the Atlantic, which we know as the Saharan region, and the other great flat area which abuts on the northern edge of the inclosed region we have already mentioned, and extends from the western boundary of Russia to eastern Siberia. This strip, which one might almost term, borrowing a physiological analogy, connective tissue between the developed regions in India and China and those of Europe, is in the last analysis a sort of mountain rampart which separates the flat lands of central Asia, with one definite type, from the flat lands of Africa and Arabia, with another type as definite. This rampart is also so situated with reference to atmospheric currents that it carries along the conditions, so far as human life is concerned, which exist along the northern edge of the Mediterranean.

RACIAL DISTRIBUTION

The effect of this upon human life first appears in race. The races of men are in general terms distributed in the eastern hemisphere in three great masses: the yellow race occupies eastern Asia, holding the region which has already been clearly indicated as the flat lands of northern Asia, its central uplift, and its eastern coast; the white race in its various forms extends from India, connected by the tract we are considering with white expansion in Europe, Arabia, and North Africa, and the black race holds two-thirds of the African continent. This general distribution sufficiently indicates the fashion in which southwestern Asia has given the bridge, whatever theory we adopt as to the origin of the Aryan race, either that the race left India and spread over Europe and the Mediterranean basin, or starting in Europe has found its way into India, occupying that peninsula until it reached in Indo-Asia and the inner inclosed basin of the con-

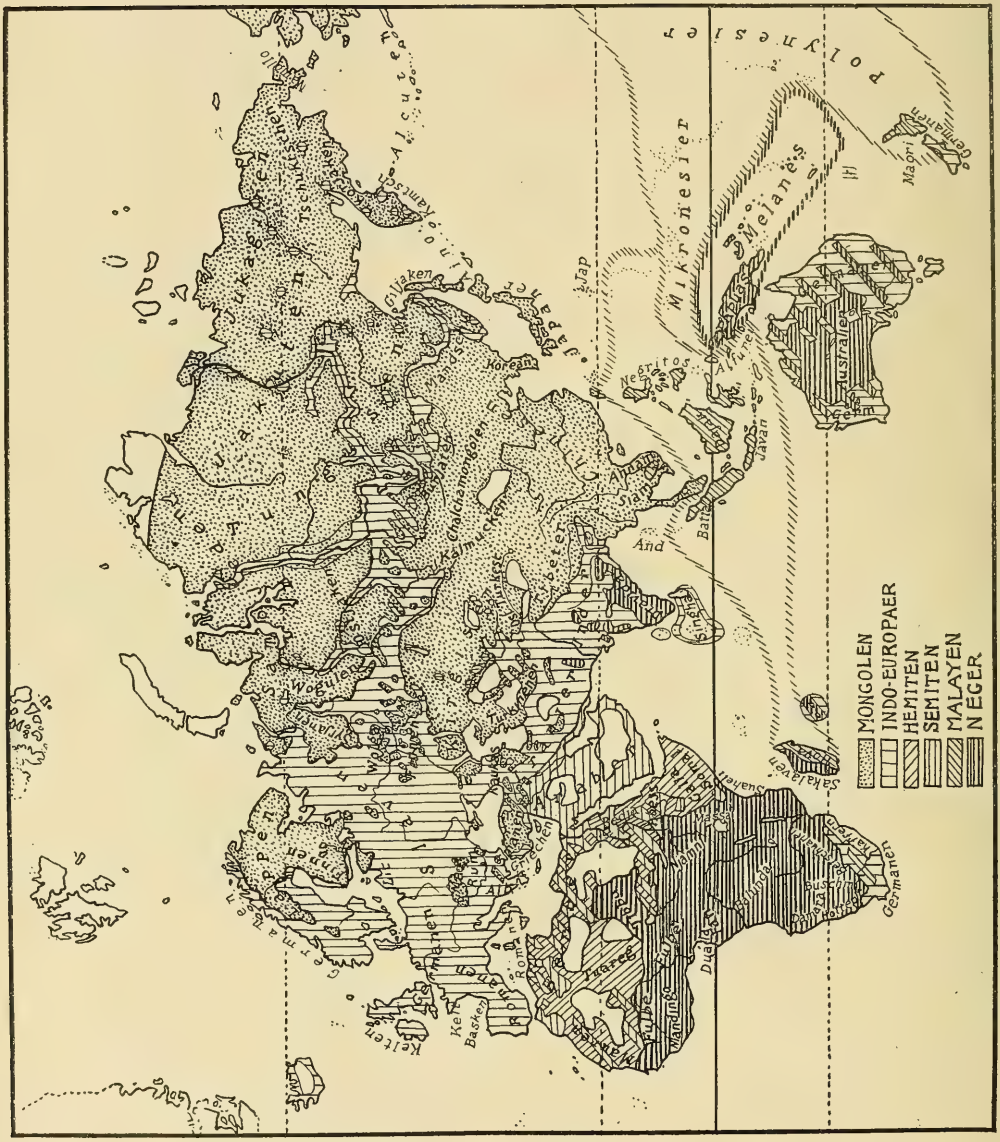
tinent the tenacious boundaries of the yellow race. These have remained substantially unaltered from the earliest gleams of race relations. A similar tenacious boundary exists in the African continent, following closely, though not absolutely, since this itself indicates a physiographic condition, the southern line of the date palm and the northern line of the banana. But when we adopt a closer scrutiny of races, as in the map, page 264, in which the chief effort has been to indicate the interrelation of the races, whose wider arrangement has been already portrayed, we discover that the bridge of which we have spoken constitutes the one region in which there has been a confused admixture of the various types which exist north and south of the Mediterranean and north and south of the Himalayan uplift, north and south, in short, of the great depression which divides Europe from Africa and the great elevation which divides northern from southern Eurasia. On southwestern Asia have flowed from the north the tides of the nomad life in the great plains, which extend without a break from northeastern Siberia to the Caucasus and the Ural. Against it have flowed from the south the Berber and Arab tribes, Hamitic and Semitic, and in some places, as in the inclosed basins of Asia Minor and the basin, once as closed, though now opened, of the Hungarian plains, congeners of the yellow races have forced their way. In a long, detached, straggling line the white races hold a slender pathway from their great mass in Europe to their great mass in India. Each of these divisions guided men by the culture developed in their native region, feeling their way along the parts of that diversified region between the plains about the Sea of Aral and the plains about the Red Sea, together with the Aryan entrance from east or west, to whatever parts of this tract best suit the culture which each has developed in its own home.



The Races of Mankind Before the European Invasion

FAUNAL DIVISIONS

What is true of this linked relation is true also of the fauna. This elevated tract between the plains of Arabia to the south and the plains of Tartary to the north, with its coterminous conditions of rainfall, climate, and flora, carries analogous animal conditions across the Eurasian mass from east to west. The roe deer among the Cervidæ, representing in size, in agility, and in a more graceful outline the gradual change from the bulkier forms of the northern species of the deer to the more slender outlines of the antelope, is found upon the Pacific coast in north China and in another extended habitat over Europe. These



Map Showing the Interrelation of the Races

Adapted from Volkerkarte der Erde, Andree's "Allgemeiner Handatlas"

two faunal regions are joined as to this species by a narrow bridge, where the roe deer is found, across Asia Minor and northern Persia; and where the roe deer runs there has always been the dawn or the full presence of organized law, of stable institutions and statecraft, whose earliest game laws are often devoted to the preservation of this creature of the chase. The pheasant, another genus which connotes distinctly marked limits of rainfall, of climate, and of a certain production of seed and insect, in like manner stretches across this continental mass, in another rude linked shape, two larger masses lying east and west, whose connections extend through the region which we are considering, and whose species enjoy a sufficiently similar environment to render it possible to transplant the Chinese pheasant to the preserves of England. Among the greater carnivora, the dividing line between the tiger and the lion runs across this region. The tiger represents the extreme Asiatic type of the Felidæ; the lion, the extreme African. The one has his most powerful development in Uganda, and the other in India. The lion extends to extreme tropical regions and beyond to the South Temperate Zone, and the tiger to Siberia and the arctic cold of the mountain regions in Manchuria. The two meet and mingle across the valley of the Euphrates and the uplands of Iranistan. Both at the point of juncture are reduced to their lesser sizes and are less dangerous to man than in their centers of largest growth, and, it is possible, of original development; but their common home exists only along the uplands we are considering, though it is difficult to give any reason why the lion should not have spread over Asia or the tiger should not have pushed his way into Arabia and so on into the African jungle. Instead, they meet without penetrating farther, like their predatory human congeners on each side of the same line, the Arabian to the south and the Turk or Tatar to the north. While the line is less clearly drawn, there is reason to believe that the ass and the horse meet in the same region, the ass representing an Arabian or Persian origin and the horse, in all probability, harking back to the Asian plain. There is some reason to think that varieties of camel, Bactrian and Arabian, meet at this point. It is only on the caravan roads of Persia and extreme eastern Turkey that one may from time to time see the single hump, the light coat, the somewhat more nimble form of the Arabian camel, with the ruder outlines, the woolly coat, and the bulkier though similar shape of the Bactrian representative of the species.

(*To be concluded in the August number*)

CHINA: HER HISTORY AND DEVELOPMENT*

By John Barrett, Formerly Minister to Siam

DYNASTY upon dynasty, including the great Sung, from 960 to 1126, followed. In this period were wars of the Chinese against the Khitans and the Kins, until finally the invincible Mongols commenced their conquest, and the way was prepared for those famous men of Chinese history, Genghis and Kublai Khan. No more interesting chapter in the history of any nation can be found than the record of the conquering armies of these Mongolian Alexanders or Cæsars or Napoleons. It is doubtful if any one of these three was a greater man than Genghis or Kublai Khan. Genghis, his son Okkodai, and his grandson Kublai were natural leaders of men and possessed rare military genius. They made invasions and conquests equal in danger and difficulties to that of Hannibal into Italy, Alexander into India, Cæsar into Great Britain, and Napoleon into Egypt or Russia. Marco Polo has sung the praises of Kublai, but the records of China tell likewise of his reign. Genghis and Kublai Khan, with Confucius, Mencius, and Li Hung Chang, are the five great names of Chinese history that come readily to our minds.

The Khitan Tatars, who had harassed the Chinese and were in turn harassed by the Khin Tatars, went down with the Khins before the Mongols under the leadership of Genghis. He extended his empire from the Caspian to the China Sea. His sway embraced forty conquered kingdoms, and he was making war on the Chinese when he died—about nine hundred years ago—and ordered his valiant son Okkodai to continue his labors.

Okkodai was pursuing the invasion of China with slow but sure results, for the Chinese resisted with wonderful bravery, when he died, and was succeeded by the mighty Kublai. He was the real conqueror of China. At Yaishau he fought the greatest battle in the annals of China; 200,000 men were killed, including Ti Ping, the last emperor of the Sung dynasty. It was fortunate for historical record that Marco Polo was in Asia during the reign of Kublai; otherwise the foreign world would never have appreciated the greatness of the man and his kingdom. When he passed away, in 1224, at the ripe age of 83, he was absolute autocrat of the most extensive empire of all time.

THE MONGOL SWAY

Thus in China there sat upon a throne almost in modern days an emperor who practically held all Asia and part of Europe in his grasp. No Roman, no Greek, no ancient or modern European king has ever held such sway; and yet some superficial critics class China as a land of barbarians, without history or civilization which can be compared with that of Europe or America. It is suggestive of later events that his only signal defeat was experienced when he strove to annex Japan. Two great expeditions against the intrepid islanders suffered disaster, and Japan remained independent. Kublai even favored Christianity. He was a good monarch, and ruled his people with kindness, but his successors were not equal to their responsibilities.

Thus again history repeated itself.

* Concluded from the June number.

The Mongol sway degenerated. The famous Ming dynasty was ushered in about the middle of the 14th century, in 1365, and remained in power for two centuries. Romantic as it may seem, the first of the Mings was the son of a poor laborer in the Yangtze Valley, who saw his opportunity, seized it, led the Chinese armies to victory, established his capital at Nankin on the Yangtze, declared himself emperor under the name of Taitsu, and made a successful expedition to Pekin, entering the northern capital unopposed with flying banners. The story of the Mings is one for the greater part of wars with the Tatars, insurrections, expeditions, and disturbances, with now and then a period of quiet and content, when education, art, literature, and agriculture were fostered.

When the assertion is made that the Chinese are not a warlike people, it assuredly is not based on the martial records of the bloody past. It seems that the major portion of Chinese history is like a prize fight, if I may use the homely figure. There is a round of hot, fast blows; then there is a minute of rest and a breathing spell, followed by another period of merciless hammering, until one man succumbs and the other wins. China for nearly fifty centuries has been a ring, and the emperors, dynasties, and different races or tribes have been the fighters for the prizes of dominion and empire.

This incessant warring by Cathay of 75 cycles has in it a suggestion of warning for the rest of the world which must not be despised. Shall we not study the Chinese all the more carefully that the American people may coöperate with rather than antagonize such a powerful and persistent race in Asia? No other people of intense political activity, from the earliest records of man to the present hour of writing, has had such a marvelous history of persistent success over all difficulties. What are America's 400 years since Columbus compared to China's fifty centuries?

As we are now approaching the modern era, I shall bring my hurried view of China's history to an early conclusion. It has been my chief purpose to reach back to that far-distant past of which the world knows too little. What has occurred in later times and in recent days is so well known and so well described in numerous books that I shall not endeavor to even carefully summarize it. We are too apt to look upon China's past as a blank, when in reality it is a well-nigh limitless period of ceaseless activity. China need not be other than proud of it. She has produced warriors, statesmen, philosophers, and poets that equal those of other great peoples. The more she is studied the more profound will be our admiration of her and her people, and the less we will think of her as a weak state, and of her people as dirty, cruel coolies, without credit for the past or hope for the future. China and the Chinese have abundant shortcomings, but none can deny that they have a wonderful history.

THE ACHIEVEMENTS OF THE MANCHUS

The end of the Ming dynasty brings us to the beginning of that of the Manchus, which now controls the throne of China. In 1644, 257 years ago, the present dominant dynasty began its reign. In view of the events of years gone by, it would not be surprising if the time were approaching for a new dynasty that will make China again one of the great powers of the world. Possibly a Wan Wang, a Kublai Khan, or a Taitsu is needed for the successful consummation of a radical movement for progress. May Kwangsu himself prove that he is equal to the opportunity and responsibility.

The achievements of the Manchus have not been limited or small. They

have done their part, and compare favorably with the preceding dynasties. Beginning in response to an invitation of the Chinese to drive out a Tatar usurper, they became in forty years the masters of China, showing surprising power and valor. Among the Manchu heroes was Koshinga, a semi-piratical leader, who expelled the Dutch from Formosa.

In the early days of this dynasty embassies began to arrive from western nations, and the Jesuit missionaries held high places on account of their mathematical and astronomical knowledge. Formosa was conquered and Chinese authority was made paramount in Tibet. Of Kanghi, who reigned for 61 years, or a cycle of Cathay, and made the Manchu sway complete over China, it is written: "The public acts and magnificent exploits of his reign show him wise, courageous, magnanimous, and sagacious. In the smallest affairs he seems to have been truly great."

In later reigns wars were waged against the Burmese and the indomitable Goorkas in Nepaul, who had invaded Tibet. Kien-Lung was another emperor of the Kanghi greatness, and under him relations with the outer world and knowledge of it among the people grew rapidly. Then followed Kia King, and then his famous son Tau Kwang, who was emperor when the first war with England aroused both China and Europe and practically opened the former to the trade of foreign nations. His reign ended with the Taiping rebellion, which swept over such a large portion of China, and was finally concluded through the skillful leadership of the eminent Chinese Gordon, who later was cruelly assassinated at Khartum. Hienfung, of mediocre abilities, succeeded Tau Kwang. Tung Chi, under whom the Taiping rebellion was subdued, followed Tau Kwang. The Mohammedan rebellion was another period of destructive interior wars, and Kwangsu, the present emperor and cousin of Tung Chi, came to the throne.

It has been my privilege to have led rapidly in review Chinese dynasties, emperors, empresses, feudal lords, usurpers, philosophers, historians, travelers, merchants, and diplomatists who have figured in the annals of Chinese history from Fuhhi, 3,000 years before Christ and 5,000 years before the present era, down to the brilliant Tsi An, who controls through Kwangsu the destinies of China at the beginning of the 20th century.

FOREIGN RELATIONS

The foreign relations in the modern sense are chiefly limited to the last fifty years. Interesting events that have a direct bearing on the present have, however, occurred through the past two centuries. Only a few salient points can be here emphasized.

With Manchuria and Russia before our eyes every day in the papers, we note that the first treaty between China and Russia was imposed, as a result of a five-years' war, by the former on the latter, in 1689. By this the whole of the Amur Valley was placed in China's hands. Nearly two centuries later, or in 1858, Count Muravieff secured for Russia the Amur Province, while in 1860 General Ignatieff, taking advantage of the presence of the Anglo-French troops at Pekin, transferred to Russia with a stroke of the pen the entire Manchurian coast line from the mouth of the Amur River to the frontier of Korea. In 1898 Russia, by the Cassini convention, took Port Arthur and Talienwan; and now, in April, 1901, the whole world is asking the significance of her occupation of Manchuria in relation to the integrity of China and the maintenance of the open door.

The French, as early as 1289, when Philip the Fair was king, received dispatches from China, suggesting common

action against the Saracens. In 1688, four centuries later, Louis XIV addressed a letter to Emperor Kanghi, whom he saluted as "Most High, Most Excellent, Most Puissant, and Most Magnanimous, Dearly Beloved Good Friend." In 1844 the first treaty was negotiated. France later engaged in war with China over the acquisition of Tonkin and Cochin-China, and a treaty was signed in 1885 giving France jurisdiction.

Germany's first expedition was in 1861, but her chief connection with China was the occupation of Kiaochau in 1897, which practically gave her control of the rich and resourceful province of Shantung.

English intercourse began with the East India Company in 1615, when it opened agencies at Amoy and in Formosa. For the next two centuries this great company's interests were England's own interests, but her position was that of a suppliant trader. In 1741, and again in 1816, British gunboats at Canton reminded the Chinese that British traders had certain rights that the mother country would protect. The embassies of Lord Macartney in 1792 and of Lord Amherst in 1815 accomplished but little.

Relations grew more and more strained after Lord Napier and Sir J. F. Davis had endeavored by authority of Parliament to establish new and better conditions. Open hostilities began in 1839. In 1841 the Island of Hongkong, now the most important port on the eastern Asiatic coast, was seized by Great Britain. This struggle was the celebrated "Opium War," which really opened China to the foreign world, and for which Britain has too often been unjustly criticised. Though it is called the Opium War, opium trading was only an incident in the list of causes. The war was waged, in fact, to stop an endless array of grievances that had accumulated during two centuries. The best result was the opening as "treaty ports" to the commerce of foreign nations Canton, Amoy, Fuchau, Ningpo, and Shanghai.

In 1856 England was again engaged in a brief Chinese war, and trouble continued until the Convention of Pekin was signed, in 1860. Other treaties, the occupation of Wei-hai-wei, Kowloon, and kindred negotiations I pass over, though important. In considering Great Britain's relations to China in the past and at present, it should be borne in mind that no other country had or has so much at stake in commerce and politics. For that reason we commend her energy in the former days and wonder at her inactivity in the last years and months.

AMERICA AND CHINA

America's relations with China have always been to her credit. Whether we consider the pioneer methods of our merchants and missionaries of a century ago or the work of our diplomatists and generals today, our Government has little or nothing of which to be ashamed and much of which to be justly proud.

The records of relations begin with the report of Major Shaw, the clever supercargo of the ship *Empress of China*, which, loaded with ginseng, sailed from New York Harbor for Canton on Washington's birthday, 1784, and returned on May 11, 1785, with a cargo of tea. The Secretary of State was then John Jay, who, like his successor, John Hay, was an honored advocate of the legitimate development of American interests. Major Shaw reported to him, and he submitted the report to Congress, which immediately resolved "That Congress feels a peculiar satisfaction in the successful issue of this first effort of the citizens of America to establish a direct trade with China, which does so much honor to its undertakers and conductors."

In the year 1832–'33 there were sixty American ships at Canton, and our trade was even then valued at nearly $17,000,000 per annum. The first American missionary was Robert Morrison, a man of great learning and ability, who arrived in China in 1807.

America commenced direct diplomatic negotiations with China in 1844, when Caleb Cushing signed the treaty of Wanghia. Since then there have been only the slightest breaks in the *entente cordiale* between China and the United States. New treaties have been drawn up when necessary, and American trade has grown more rapidly than that of any other foreign nation engaged in the competition for the control and profits of Asiatic markets.

Our commercial opportunity in China, which is a favorite theme of mine for discussion prompted by many years of official and private study and residence in Asia, is the greatest in potentialities of any beyond our shores. Today our trade exchange with China, including Hongkong, is valued at $45,000,000 per annum, and yet it is in the infancy of its development. Making conservative estimate on the basis that the "open door" is preserved in China, that the interior of the Empire is made accessible by railways, and that the government becomes progressive, there is no valid reason why our commerce with Cathay in 1925 should not have grown tenfold and be valued at $450,000,000.

These possibilities remind us of the supreme necessity of the protection of our treaty rights throughout all China, from Manchuria to Kwangtung. It is gratifying that President McKinley and Secretary Hay are shaping our policy at Pekin with reference to the importance of our interests, present and future. We want and will take no territory, no ports, but we contend for the unhampered privilege of trading everywhere in China on the same basis and with the same privileges, without discrimination, as any and all foreign nations.

After the maintenance of the "open door," the chief object of American effort in the matter of commerce would seem to be the abolition of the so-called Lekin or interior taxes on foreign goods when they have left the treaty ports for their destination. It is no exaggeration to predict that the foreign trade with China would double in five years if the duty paid at the custom-house was the only burden on foreign imports. The chief object in the new commercial treaties which will be negotiated at the conclusion of the present difficulties will be the protection of foreign imports from Lekin, barrier, and destination taxes, or "squeezes."

AMERICAN INTERESTS IN MANCHURIA

The future of Manchuria directly concerns the United States. In one way we have more at stake than any other nation. More American products are sold there than in any other portion of China. American imports to Manchuria exceed those of any other nation. The outlook in ordinary conditions for the increase of American trade in Manchuria is better than elsewhere in Asia, and hence the situation appeals to American export interests, especially to the cotton industries of the Southern States.

I am making no comment on the diplomatic issue at stake, nor on the policy of Russia, but I am telling the simple truth about Manchuria's importance. Having crossed it from Niuchwang to Vladivostok by way of Kirin and Mukden, I can say that it is prospectively one of the best sections of China, capable of supporting a large population and providing an extended market. When I first visited Niuchwang, some eight years ago, American imports were barely worth 15 per cent of the total; when I went there last, in 1898, they were 50 per cent of the total and were still growing. It is the Manchurian demand, for instance, that has caused the wonderful increase to $10,000,000 in the value of

our manufactured cotton goods sold in China. The demand for flour, oil, manufactured iron and steel bids fair to increase in like proportion if the door of trade is not closed against us.

If, now, I should summarize public opinion in regard to China and our policy, as it has been my privilege to test it in addressing commercial and missionary organizations in all parts of the United States from San Francisco to New York and Chicago to New Orleans, I should state, first, that public sentiment, regardless of party, is undoubtedly heartily in sympathy with our Government's policy, and, second, that if this opinion were crystallized into specific expectations it would name the following provisions :

1. Every legitimate effort should be made to preserve the integrity of the Chinese Empire and the freedom of trade throughout its extent as originally outlined in the old treaties, while needed reforms in administration of government and foreign intercourse are duly advocated and pressed.

2. Indemnities should not be demanded by government, missionaries, or merchants except within the lowest reasonable limits, and the entire question of indemnities and kindred issues should be referred to an International Tribunal of Arbitration as provided by the Hague Peace Treaty.

3. New treaties of commerce and amity should be negotiated as soon as is practicable by the ministers at Pekin which will give every nation equal rights of trade throughout all China, provide for the abolition of the Lekin and other offensive taxes, and insure the "open door" for commerce and Christianity alike.

4. Charity and not revenge, with punishment only for those responsibly guilty and within the Chinese Government's power to punish, should characterize the demands of merchants and missionaries, as well as of our Government, for in that way we will eventually win the lasting gratitude and favor of China's government and people, strengthen our own position, and develop the best guarantees within and without China for an "open door" for both God and Mammon.

Finally, we note that a study of Chinese history and character enables us to understand better the mighty influences now at work in China. It forces us to draw certain remarkable conclusions that throw light upon the present crisis at Pekin, but which are not generally remembered in popular discussion of the problem before us.

CONCLUSION

There is danger of misunderstanding and underrating the people and the possibilities of China in war and in peace, because the wonderful past of the empire is not commonly known.

First. It may seem surprising, but it is a truthful statement in the light of history, that the Chinese, if necessary, are a warlike people. They are born warriors. They inherit a capacity and tendency to fight from a longer line of fighting ancestors than is the heritage of any or all of the Powers now arrayed against them at Pekin. The soldier may be unpopular in the social and political life of the empire from the teachings of the classics, but the salient fact remains that wars and soldiers have engaged the attention of the empire and people more than peace and scholars during her fifty centuries of sway. The lack of an organized army is a mere passing incident of the times.

Second. The recent Boxer uprising and seizure of the legations, while they rightly appear in the judgment of the hour to be fraught with great possible results both to China and the foreign world, are secondary events when compared to scores of uprisings and difficulties in China's seventy cycles and

twenty-five dynasties. The massacres, men engaged and killed, area of disturbance, and vexations of settlement and indemnity are, after all, limited when we balance against them the events of centuries that are gone.

Third. The end of China is not yet. If she is divided, it will in history be only a temporary division, but one suggestive of revenge and consequent danger to the white and Christian races.

If she is not divided, a new and grander period of progress and civilization will surely follow the troubles and haze of the past sixty years, just as has been the almost invariable experience of the great past. Men and means will be forthcoming to build up this newer China. Whether this era is inspired from within or without, whether it comes with a new dynasty, a new emperor, or with the present emperor supported by foreign hands, the world will yet see greater things in China than it has ever viewed in America or Europe. As China's 400,000,000 people must by law of nature increase to countless more millions, and as her 4,000,000 square miles, with their vast unsurpassed resources, must inevitably respond to material development, so her 4,000 years of history as a nation and people, with their rich experience, their reserve energy, their conservatism, their recuperative capacity, their homogeneity, teach us to believe that China will survive successfully the present crisis.

Is not, therefore, the policy of our Government—that of mingled firmness and charity—a wise one?

If we protect our treaty rights, demand just punishment without revenge, respect China's inalienable prerogatives, and show dignified generosity in the evolution of the new status, we shall have China's 400,000,000 people as our lasting friends rather than our everlasting enemies.

THE INDIAN VILLAGE OF BAUM

THERE is an exhibit in the Ethnology Building at the Pan-American Exposition in Buffalo that will be of special interest to archæologists, as it represents a discovery so recent that no previous exposition has had the opportunity of exhibiting it to the world. It is the remains of the Indian village of Baum.

Prof. William C. Mills, of Columbus, Ohio, curator of the Ohio Archæological and Historical Society, who was instrumental in the finding of Baum, came to Buffalo to install this exhibit. Most of it is placed in glass cases, but the central feature is a little graveyard on the floor-space directly under the great dome. It is bounded by an iron railing, within which black loamy soil has been neatly packed as a bed for the prehistoric skeletons it has been Professor Mills' ghoulish task to arrange. Bone by bone he unpacked them and fitted them together into the ghastly semblance of men, women, and little children. There they lie in the same relative positions in which they were found in buried Baum.

So new and yet so old is Baum that only a few of the best informed even know its name. It was discovered last year, in Ross County, Ohio, and was named for the man who owned the property. Archæologists in the Indian field consider it one of the greatest finds of the century. The village encircled one of those great mounds that have so long been the wonder and curiosity of latter-day races. Mound and village have thus helped to interpret each other. Wise

men have read strange stories in the bones and stones they found there, and both are laid out now, like an open book, in the Ethnology Building for the public to peruse.

On the ground above the village trees were growing that had sprouted not less than eight hundred years ago. The people whose tools and toys we contemplate today had rotted in their graves four hundred years before Columbus saw America. If they were there when the Norsemen visited Vineland the Good, neither people learned of the other. There is absolutely no suggestion in any of their relics that they had ever had the remotest contact with a European race. They were a primitive, aboriginal people, that returned to the soil as mysteriously as they sprang from it.

The implements they fashioned out of the rude materials about them show that they had reached a high degree of civilization for a prehistoric people. It is marvelous to see to what uses they put the bones of animals. From the bones of deer, bear, coon, and wild turkey they fashioned needles, awls, fish-hooks, and arrow-points. Not only are there plenty of fish-hooks made from bone, but there are pieces of bone to show the various stages of manufacture.

What a patient creature was the primitive man! How pathetic are the traces of his first early struggles to create! There are the pieces of bone which he had slowly hollowed and polished and cut to make a hook. There, too, are his failures, the hooks that he broke before he had done, the eloquent tokens of bootless pains.

Side by side with bone arrow-points are those of flint. Probably each weapon had its advocates. Flint knives, flint drills, tell of rude skill definitely directed. A stone awl-sharpener bespeaks the careful workman.

In the collection is a small carved stone. The characters on it are quite plain to all, rude as they are, but the interpretation is not clear. Wigwams are indicated by a few artistic strokes of the knife. Nearby are a turtle and a fox, and above is a watchful eye looking down on all. What is the story the Indian artist tried to tell?

Some pieces of pottery were found that make one think of the modern Mexican's handiwork. The bowls are rudely wrought, but a stone slab, with a stone roller, is almost the exact counterpart of the Mexican metate. Like the Mexican woman of today, the squaw of old knelt patiently, hour after hour, grinding corn on the metate for the simple maize cakes that were the staff of life. Corn of the eight-rowed and ten-rowed variety was found in the buried village; also beans, wild grapes, papaw seed, walnuts, hickory, wild plum, chestnuts, and hazel nuts.

Turtle shells, used for drinking cups, and stone pipes of really dainty cut are among the recovered treasures. Discoidal stones with holes in them suggest games of chance, such as all early people delighted in.

Many of these articles are found in ash-pits or refuse heaps that had been sunk about the village to keep it in tidy condition. Others were found in the graves. Ornaments, in the shape of bone or bead necklaces, were discovered with the skeletons of children in particular. The teeth of the elk, cut and perforated, are plentiful in some graves.

It is strange that nowhere does one find human bones used for utilitarian purposes. There are awls made from the tibia-tarsus of the wild turkey, from the shoulder blades and from the ulna of deer and elk, but nothing from the human scapula or femur. One of the most interesting collections is that of scrapers, used to remove the hair from the hides of animals, to dress them for raiment. They are made from the metacarpal bones of the deer and elk, and great quantities of them were found.

Among the heaps of bones were many

that had a strangely familiar look to Professor Mills. They carried him back to his boyhood days and reminded him of the bones his pet dog used to gnaw. So he began to look for the dog, and he found him, the early Indian canine, with a skull like a modern bull terrier's. He, too, has gone to the happy hunting grounds of his father.

The Historical Society, of which Professor Mills is curator, is interested in preserving archæological and historical relics to posterity. The famous Fort Ancient, in Warren County, has been set aside by the society's endeavors in a park of 300 acres for public edification. The great Serpent Mound, in Adams County, has been similarly emparked. It is an embankment 1,300 feet long and three feet high, which is an eloquent monument to human endeavor, and as such should be preserved.

H. C. BROWN.

THE GEOGRAPHY OF ABYSSINIA*

THE geography of Abyssinia is now fairly well known as far as the rivers and boundaries are concerned, but there is a great deal to be learned regarding the Danakil country on the east and the country to the south and southwest. The best maps of the country are those made by the Italians, but they are rather bewildering by the number of names they contain of unimportant little places consisting, perhaps, of three or four houses. Unless a map is made on a very large scale, say two inches to a mile, it is impossible to put in all the villages and local names for the small streams, etc. Many of the mountains are differently called by the inhabitants of the various slopes, and therefore names are not always to be relied on. If the local market towns are marked and those villages that possess a church, travelers will have no difficulty in finding their way about the country, and supplies can generally be purchased on market days to enable them to proceed from one market town to another.

The Italian colony of Erithrea, which bounds Abyssinia on the north, is well surveyed, the heights of mountains, government stations, and plateaus have all been determined, and statistics of rainfall and temperature are kept and published. Abyssinia is not at all a difficult country to travel in on account of the very conspicuous landmarks and the enormous extent of the landscape that is visible from the various high mountains. The atmosphere in the highlands is wonderfully clear, and enormous distances can be seen. From Halai, in the north, the Semien Mountains are visible on a clear day. Above Wandach the Semien can also be seen, and from Wandach the mountains to the north of Ifat, and from there the mountains round Cunni, in the Harar province, are visible, and it might be possible, perhaps, to heliograph from one point to the other. Part of Halai range is also visible from Massowah on a clear day.

The climate in the highlands of Abyssinia is superb, and it is only in the valleys that it is unhealthy and that malarial fever is to be caught. There is a great discussion going on at present about the mosquito, and it seems curious to me, who have lived in so many unhealthy parts of the East, that the at-

* From *Modern Abyssinia*, by Augustus B. Wilde. Pp. 506, with map and index. London: Methuen & Co., 1901.

tention of doctors has not been drawn to this insect before. I have invariably found that where there is stagnant water contaminated by drainage and decomposing vegetable or animal matter the sting of the mosquito that breeds in this water is very venomous and causes feverish symptoms. This fact is so well known to the Abyssinians that they never build their houses in the valleys where mosquitoes abound, but always place their dwellings on the summits of the nearest hills. When they work in the cultivated parts of these valleys they always surround their fields with very strong hedges, so that they need not remain at night to watch their crops, and even in the harvest time, at the dryest season of the year, they do not leave their houses in the morning until the mists in the valley clear away, and they always return to them before sunset, when the mosquito commences to come out.

Very little fever was known at Suakin before the Egyptian steamers commenced running there frequently ; there were no mosquitoes in the place, and curtains to the beds were never used, although on the other side of the Red Sea, at Jeddah, sleep was impossible without them, and Jeddah is known also as a very feverish place. The mosquito was, there can be no doubt, imported from Suez in the fresh water brought thence in the water tanks of the Egyptian steamers for the use of the Egyptian officials. Now at Suakin the mosquito is quite common in the town, and so is fever, while outside the town fever and the insect are unknown.

By looking at the map of Abyssinia one will find the belts of tropical valley to be very few, and greater altitude in the center, along part of the Tacazze and Blue Nile Rivers, with a few of their tributaries. Sheltered and confined valleys in all parts of Abyssinia are, however, not nearly so healthy as the opener ones of greater altitude. A traveler need never spend more than a night or two in unhealthy parts. It is, however, different with the sportsman ; to enjoy the best of sport he must follow the game that inhabits the damp jungle, and during the rainy season he is lucky to escape a bout of fever.

With regard to the botany of Abyssinia, the greater part of the country has been thoroughly worked out, especially by the late Professor Schimper ; his son, who traveled with me a good deal in the country, informs me, however, that his father did hardly any work in the eastern half of the country, and then only in the dry season ; so there is still a great deal to be learned about the plants that are to be found in this part during the wet season and immediately after it. Geographical details of Abyssinia, such as the amount of rainfall over a series of years at different stations, are sadly wanted. The Italians can supply details of the north in the Hamasen, but there can be no doubt that central and southwestern Abyssinia have a much greater rainfall than the northern part of the country, and the extremes of temperature are also greater in these parts.

There is very little known about the geology of the country, and as it has been so broken up and shows such grand disturbances, its formation should be very varied and should contain many surprises, and minerals should no doubt be plentiful in some parts. Gold has been found in many places since the earliest times, but the centuries of anarchy and confusion which the country has undergone has prevented any thorough examination of the different districts in modern times, and from the time of the Axumite dynasty till 1895 Abyssinia never had a coinage of her own, so that there was no necessity to seek for the more precious metals.

Coal has been reported in several places, but I have seen nothing but black shale. I cannot say whether it exists in the west of the country round

Lake Tsana, as reported, as my journeys have always been in the eastern half of Abyssinia, and I am certain that no outcrop exists in this part, unless on the slopes toward the Danakil country, which I think highly improbable, owing to the volcanic formation.

There is here a large and very interesting field for scientific research, and many years must lapse before Abyssinia is thoroughly known; it is not likely, however, that it will be opened up while the power is all in the hands of one person. Italy will no doubt take her share in the development that is bound to come sooner or later, and her territories will be explored long before the rest of the country. Unforeseen circumstances may arise which will allow an opening up of Abyssinia more speedily than the present prognosticates, but I hardly think that they are likely unless some radical change takes place within the next few years; in the meantime, however, the artist, archæologist, botanist, and others can do good work in learning more about the country and bringing its details before the public. From the lower classes they will receive a hearty welcome, as from a great many of the well-to-do people who wish to see their country opened up and an end put to the constant disputes that arise among the upper classes.

OIL FIELDS OF TEXAS AND CALIFORNIA

DR. DAVID T. DAY, chief of the Division of Mineral Resources of the United States Geological Survey, contributes to the *Review of Reviews* for June an authoritative and interesting statement regarding the recent discovery of oil in the great States of Texas and California. The following paragraphs are taken from his article:

For some reason (for which a common cause would be difficult to find), the last year has been marked by petroleum crazes, unusually serious and in widely separated areas. Only a year ago the attention of those interested in extending our crude-petroleum resources was centered on the new fields in Roumania, which are destined to yield large supplies of oil. But even before this the development of West Virginia had been actually adding to our supplies far more oil and promises of more than Roumania or the more sensational developments abroad or at home. Then came the excitements of the Indian Territory. The importance of California's oil fields in Ventura County, in Los Angeles, and in Santa Barbara, was increased tenfold by the discoveries in Kern County. Then all oildom went crazed again by the discovery of a great field in the region of Beaumont, Texas. One might condense the sensational reports of all these new oil fields by imagining that a tidal subterranean wave of oil had moved up toward the surface of the earth and found vent, first in California, then in Wyoming, and finally in Texas!

The California discovery is likely, of all those which have been mentioned, to be of greatest value; not for quantity of oil, but for the development of the country. California has been poorly supplied with fuel in comparison with Pennsylvania or Ohio or any of the States where cheap coal has developed enormous industrial enterprises. California cannot continue as a great commonwealth, past the agricultural or even more temporary treasure-mining stage, without a great supply of fuel. It is at least partially afforded by the Bakers-

field oil, and it will be the work of the United States Geological Survey this year to so correlate the various oil-bearing strata on the Pacific Slope as to make further discoveries probable.

Traces of oil have been found in California from Mendocino County on the coast (and extending inland a few miles) southward nearly to the southern extremity of the State. Usually the finds have been merely of traces, not even sufficient to cause an excitement; but in the southern part of the State the deposits of thick oils in Ventura County prove sufficient to furnish valuable amounts of fuel. In the city of Los Angeles and at Anaheim the discoveries were sufficient to arouse the usual wild excitement. The feature of this Los Angeles excitement was the finding of many wells, most of them productive only to a moderate extent, the aggregate unimportant for the general supply.

A remarkable feature of the oil industry in California has been the discovery that off the coast of Santa Barbara oil could be obtained by drilling under the Pacific Ocean, near the beach, and this added considerably to the supply of oil, all of it peculiar in being thick, containing as a characteristic a considerable quantity of asphaltum and not yielding paraffine wax by the ordinary processes of refining. It has been possible by refining to obtain kerosene from this ordinary California oil, but not economically.

Within the last two years a marked change has taken place in the economic phase by the discovery, first at Coalinga, in Fresno County, of lighter oil, much more promising to the refiner, and this was followed by similar discoveries, but on a larger scale, in the neighborhood of Bakersfield, in Kern County. The result of these discoveries is well indicated by the fact that there are now over 1,100 oil locations in the State of California, of which 600 are near Bakersfield. The excitement has been sufficient to make oil prospecting more popular than gold prospecting, which has continued in California without cessation since 1849. The oil from these newly discovered fields in Fresno and Kern counties will undoubtedly admit of refining for the production of illuminants, but the great value such finds in California will be in providing a large supply of power-producing fuel. Further, it must be remembered that the great progress in hydraulic engineering in California will not only supplement this oil fuel by extremely progressive use of water-power, but the same means by which water-power has been carried long distances at phenomenally low cost will be applied to developing our pipe-line systems beyond their present efficiency in the East.

Had it not been for the unfavorable experience in refining the California oils, with their great percentage of asphaltum, the discovery of oils somewhat similar in Texas would have been more auspicious. Nevertheless, this Texas discovery, with which every one is more or less familiar, is certain to exert as powerful an influence on the petroleum industry in general as the California oils will have upon the local industrial conditions of a State. The accidental discovery of moderate supplies of petroleum at Corsicana, Texas, a few years ago was sufficient to attract the attention of oil men to that State and to have near at hand experienced men and apparatus for well drilling when the final discovery of Captain Lucas, near Beaumont, announced a really great oil field. The details of this discovery are interesting. To Capt. Anthony F. Lucas is due the fact that this discovery was made last year, and not many years later, as would have been consistent with normal development. Captain Lucas visited the writer in Washington, and asked his aid in interesting the oil fraternity to help him in drilling a well at

Beaumont, Texas, where he felt sure that a profitable field would be developed. The reports of the United States Geological Survey indicated at that time the probability of finding oil in this vicinity, because of the external oil indications which had long been observed there; but it was not the province of the Survey to promote any individual locality; therefore Captain Lucas sought further, and without much success.

While the Texas oil-fever is still at its speculative height, the same excitement has broken out in a new spot—western Wyoming—on the Oregon Short Line Railroad. The construction work of the railroad company developed a flowing well which, when allowance is made for the enormous exaggeration which inevitably follows in this industry, yields perhaps five barrels per day. The result has been the incorporation of many companies to take up tracts of heretofore very low-priced land. The lack of confidence of the present speculators is well shown by their inactivity as to actual drilling. Nevertheless, we can recognize that geological conditions are favorable for a considerable supply of petroleum in this neighborhood of the ordinary easily refined quality—a fact which is only of considerable interest to the public it the developments cause the typical sensation-producing "gushers," in which case the excitement will be of value by peopling a region which would otherwise remain undeveloped for many years. We already know of good oil fields in the neighborhood of Casper, Wyoming, and in many other portions of the State, but they have lacked sensationalism and have been subject to conservative development by careful men.

THE SERI INDIANS

SEVERAL years since Prof. W J McGee and Mr. Willard D. Johnson passed several months in the land of the Seri, studying the country and the customs of these little-known people.

A brief summary by Mr. McGee of the work then done appeared later in this Magazine (volume vii, No. 4). The Bureau of American Ethnology has recently published in a handsome volume the official report of Professor McGee, from which the following extracts are made:

The most noticeable social fact revealed about the Seri rancherias is the prominence of the females, especially the elderwomen, in the management of everyday affairs. The matrons erect the jacales without help from men or boys; they carry the meager belongings of the family and dispose them about the habitation in conformity with general custom and immediate convenience, and after the household is prepared the men approach and range themselves about, apparently in a definite order, the matron's eldest brother coming first, the younger brothers next, and finally the husband, who squats in or outside of the open end of the bower. According to Mashém's iterated explanations, which were corroborated by several elderwomen (notably the clan-mother known to the Mexicans as Juana Maria) and verified by observation of the family movements, the house and its contents belong exclusively to the matron, though her brothers are entitled to places within it whenever they wish; while the husband has neither title nor fixed place, "because he belongs to another house"—though, as a matter of fact, he is frequently at or in the hut

of his spouse, where he normally occupies the outermost place in the group and acts as a sort of outer guard or sentinel. Conformably to their proprietary position, the matrons have chief, if not sole, voice in extending and removing the rancheria; and such questions as that of the placement of a new jacal are discussed animatedly among them and are finally decided by the dictum of the eldest in the group. The importance of the function thus exercised by the women has long been noted at Costa Rica and other points on the Seri frontier, for the rancherias are located and the initial jacal is erected commonly by a solitary matron, sometimes by two or three aged dames; around this nucleus other matrons and their children gather in the course of a day or two; while it is usually three or four days, and sometimes a week, before the brothers and husbands skulk singly or in small bands into the new rancheria.

MARRIAGE

The most striking and significant social facts discovered among the Seri relate to marriage customs.

As noted repeatedly elsewhere, the tribal population is preponderantly feminine, so that polygyny naturally prevails; the number of wives reaches three or possibly four, averaging about two, though the younger warriors commonly have but one, and there are always a number of spouseless (widowed) dames, but no single men of marriageable age. So far as could be ascertained, no special formalities attend the taking of supernumerary wives, who are usually widowed sisters of the first spouse. It seems to be practically a family affair, governed by considerations of convenience rather than established regulations—an irregularity combining with other facts to suggest that polygyny is incidental, and perhaps of comparatively recent origin.

The primary mating of the Seri is attended by observances so elaborate as to show that marriage is one of the profoundest sacraments of the tribe, penetrating the innermost recesses of tribal thought, and interwoven with the essential fibers of tribal existence. Few, if any, other peoples devote such anxious care to their mating as do the Seri,* and among no other known tribe or folk is the moral aspect of conjugal union so rigorously guarded by collective action and individual devotion.

The initial movement toward formal marriage seems to be somewhat indefinite (or perhaps, rather, spontaneous). According to Mashém, it may be made either by the prospective groom or by his father, though not directly by the maiden or her kinswomen. In any event the prerequisites for the union are provisionally determined in the suitor's family. These relate to the suitability of age, the propriety of the clan relation, etc., for no stripling may seriously contemplate matrimony until he has entered manhood (apparently corresponding with the warrior class), nor can he mate in his own totem, though all other clans of the tribe are apparently open to him, while the maiden must have passed (apparently by a considerable time) her puberty feast. In any event, too, the proposal is formally conveyed by the elderwoman of the suitor's family to the maiden's clanmother, when it is duly pondered, first by this dame and her daughter matrons, and later (if the proposal is entertained) it is deliberated and discussed at length by the matrons of the two clans involved, who commonly hold repeated councils for the purpose. At an undetermined stage and to an undetermined degree the maiden herself is consulted; certainly she holds the power of veto, ostensible if not actual. Pend-

* Perhaps the closest parallel in this respect is that found in the elaborate marriage regulations prevailing among the Australian aborigines, as described by Spencer and Gillen, Walter E. Roth, and other modern observers.

ing the deliberations the maiden receives special consideration and enjoys various dignities. If circumstances favor, her kinswomen erect a jacal for her, and even if circumstances are adverse, she is outfitted with a pelican robe of six or eight pelts and other matronly requisites.

When all parties concerned are eventually satisfied a probationary marriage is arranged, and the groom leaves his clan and attaches himself to that of the bride. Two essential conditions—one of material character and the other moral—are involved in this probationary union. In the first place, the groom must become the provider for and the protector of the entire family of the bride, including the dependent children and such cripples and invalids as may be tolerated by the tribe—*i. e.*, he must display and exercise skill in turtle-fishing, strength in the chase, subtlety in warfare, and all other physical qualities of competent manhood. This relation, with the attendant obligations, holds for a year—*i. e.*, a round of the seasons. During the same period the groom shares the jacal and sleeping robe provided for the prospective matron by her kinswomen, not as privileged spouse, but merely as a protecting companion; and throughout this probationary term he is compelled to maintain continence—*i. e.*, he must display the most indubitable proofs of moral force.

During this period the always dignified position occupied by the daughter of the family culminates. She is the observed of all observers, the subject of gossip among matrons and warriors alike, the recipient of frequent tokens from designing sisters with an eye to shares of her spouse's spoils, and the receiver of material supplies measuring the competence of the would-be husband. Through his energy she is enabled to dispense largess with lavish hand, and thus to dignify her clan and honor her spouse in the most effective way known to primitive life, and at the same time she enjoys the immeasurable moral stimulus of realizing that she is the arbiter of the fate of a man who becomes warrior or outcast at her bidding, and through him of the future of two clans—*i. e.*, she is raised to a responsibility in both personal and tribal affairs which, albeit temporary, is hardly lower than that of the warrior chief. In tribal theory the moral test measures the character of the man; in very fact, it at the same time both measures and makes the character of the woman. Among other privileges bestowed on the bride during the probationary period are those of receiving the most intimate attentions from the clanfellows of the groom; and these are noteworthy as suggestions of a vestigial polyandry or adelphogamy. At the close of the year the probation ends in a feast provided by the probationer, who thereupon enters the bride's jacal as a perpetual guest of unlimited personal privileges (subject to tribal custom), while the bride passes from a half-wanton heyday into the duller routine of matronly existence.

The Whaling Steamer Eric leaves Sydney, Nova Scotia, the latter part of July, to carry supplies and letters to Peary. Mr. H. L. Bridgman, Secretary of the Peary Arctic Club, will probably accompany the relief party.

The Baldwin-Ziegler North Polar Expedition is on the way to the Arctic regions. Mr. Baldwin, before leaving, declined to outline his plans beyond stating that Franz Josef Land would be the base of the Arctic campaign.

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Vol. XII AUGUST, 1901 No. 8

CONTENTS

ASIA, THE CRADLE OF HUMANITY. BY W J McGEE, VICE-PRESIDENT OF THE NATIONAL GEOGRAPHIC SOCIETY . PAGE 281

THE LINK RELATIONS OF SOUTHWESTERN ASIA BY TALCOTT WILLIAMS, LL. D. ILLUSTRATED 291

THE OLD POST-ROAD FROM TIFLIS TO ERIVAN. BY ESTHER LANCRAFT HOVEY. ILLUSTRATED 300

JOSEPH LE CONTE 309

MOUNT McKINLEY 312

GEOGRAPHIC NOTES 313

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THE NATIONAL GEOGRAPHIC MAGAZINE

ASIA, THE CRADLE OF HUMANITY*

BY W J McGEE, VICE-PRESIDENT NATIONAL GEOGRAPHIC SOCIETY

NEVER have I been so overwhelmed with the magnitude of a task as in beginning this attempt to epitomize Asia in an hour.

Asia is the Continent of continents; a giant land to which Africa is but an appendage and all Europe only an excrescence. Larger as to mainland than both Americas combined, Asia with her insular extension southeastward might swallow the great landmass of Africa with Europe in addition. Of the 50,000,000 square miles of land on the face of the earth, Asia holds fully 15,000,000, or three-tenths of all—indeed, stretching as she does from the equator to the very shadow of the pole and within a few degrees of half way around the globe, she is as a world in herself, and can be likened to the rest of the planet only by means of superlatives: Her climate ranges from the utmost type of torridity to extremest cold, from heaviest equatorial torrents to bleakest aridity, from recurrent tropical typhoon to poleward calm. Her features are stupendous as her expanse is vast: The Himalaya Mountains and the Pamir Plateau—the Asian highlander's "Roof of the World"—make pygmies of all other elevations on earth. The world's most extensive plain forms central and northern Asia, and comprises the greatest tundra and vastest forest on the planet; one of the two largest deserts of the world (Gobi, with its extension in Takla-Makan) lies at the eastern base of this unparalleled upland, though out of the world's ten rivers exceeding 2,500 miles in length six are in Asia as against two in Africa and one in either America—and even this reckoning misses three of the mightiest among the world's waterways (Ganges, Brahmaputra, and Indus), rivers raised to foremost rank by unequaled loftiness of basin and swiftness of flow. Gauged by any measure, Asia is Titanic, the land of all lands in length and breadth, the queen of continents.

Great as is physical Asia, human Asia is far greater; for as the home of mankind and the cradle of culture, she outcounts all the rest of earth. Out of the world's population of 1,500,000,000, nearly 900,000,000, or six-tenths of the

*The closing lecture of the Afternoon Course of 1901 on "The Growth of Asia."

whole, abide in Asia ; out of the four or five or more races of men, all but one (the Amerind) are indigenes of Asia or its immediate insular and peninsular extensions ; and if Egypt be placed with Arabia (where she belongs in every cultural aspect), then out of the fifty or eighty centuries of recorded history running from the hazy dawn of antiquity to the clear light of modernity, the earlier half must be credited wholly to Asia. Music and drama were old in Asia before Athens and Rome were planted, and oriental schools of painting and sculpture prepared the way for a nobler culmination in Greece and Italy. In industries, the long, long way from bestial tooth and claw to the stone knife and thence to the metal tool was first trodden by Asian folk and their Egyptian brethren ; nearly all of the world's domesticated animals came from Asia, where horses and kine, sheep and swine, and the dog and fowl were tamed in the eastern morning of humanity (undoubtedly through uncounted generations of totemism and beast-worship after the manner of all lowly men) and the cat and the camel were caught in some part of that industrial tide which ebbed and flowed over the Red Sea basin for millenniums, while the hardy reindeer of the arctic and the ponderous elephant of the tropics were enslaved so late as yet to retain the characters of their wilder kindred ; so, too, the world's richest crop-plants, like wheat and rice, oats and barley, were created in Asia by ages of experiment to feed millions, and to render all other lands eternal debtors to the queenly continent. The fundamental laws of the world, from mother-right to the Decalogue and from blood-venge to the Golden Rule, were framed in Asian centers and tested by the experience of millions before their germs were exported by Cecrops and Romulus and sown by Solon as seeds of future justice ; and it is to Asia that the student turns for the longest dynasties, the largest nations, the grandest empires in history. Most of the well-springs of language flowing westward to unite in the great Aryan reservoir of world-speech arose in Asia ; several Asian centers gave letters to the eastern world long before Cadmus came to Greece ; and despite the teeming output of the occidental press of a century, a large share of the literature of the world is still Asian, and leading poets and prosaists of western lands are flocking back to the oriental storehouse for motives just as their contemporaries are building new towns out of the ruins (and for the spoils) of ancient cities. Of the nine world religions that have spread to millions of men—Shintoism, Brahmanism, Buddhism, Taoism, Confucianism, Judaism, Zoroastrism, Mohammedism, with the sublimation of their finest essences in Christianity—all were nurtured in Asia, and all but one attained highest development beyond the Bosphorus ; indeed of the modern sciences, three—mathematics, astronomy, chemistry—originated in the almacabala and astrology and alchemy of ancient Asia; while the metaphysical philosophies of even mid-European shrines are dull and feeble besides the ethereal emanations of the oriental mind, emanations so subtle yet strong as to react in bodily abnegation (in the self-immolation of the suttee, in the ecstatic self-torture of the dervish dance, and in the hypnotic self-paralysis of priestly fakirs) far transcending the saner powers of the western world.

Such is human Asia. Seen in any aspect, she is extended, picturesque, majestic, full of meaning ; viewed in her various phases at once, she is bewildering in wealth of detail, if not an utter chaos of redundant facts. It were easier to deal with the human affairs of all of the rest of the world together than with those of Asia alone.

Happily the scientific student is not

unaccustomed to dealing with chaotic assemblages—indeed, it is his business to classify facts by their relations, to reduce these to principles, and thus to bring order out of chaos. Now in seeking to classify so vast an array of facts as that presented by human Asia, it were well to profit by the widest possible range of experience, by the wisdom of the ages as well as by the methods of modern science; and this is made fairly easy and safe by the nearly uniform ways in which the minds (and the tongues) of men respond to the stimulus of the unknown—for every language has its spontaneous interrogatives arising in natural order, whereby child and sage alike seek ever to enlarge their store of knowledge.

What (or who)? Where? How? Whence (and whither)? Why? These are the normal interrogatives of our vigorous language; they may be translated into other tongues so widely as to prove that they express spontaneous impulses of inquiring minds—indeed, they are thought-mates to demonstratives of voice or gesture shared by all higher animals; and their order is fairly uniform from prattling childhood to old age, and from savagery to enlightenment. Science finds guidance and strength in the unreckoned experience embodied in these nature-questions, yet reciprocates in full measure by defining the questions more clearly and fixing their order on a rational basis; and it is through this wedlock between common sense and practical science that the chaos of Asian facts may perhaps become understandable.

THE RACES OF ASIA

What are the peoples of Asia? Time was when this inquiry would have been met by a list of the races occupying the great continent, defined by the standards of the day; and the enumeration might have ranged from two to a score or more, according to the definitions of the particular doctor thus opening the door to disagreement. Of late less attention is given to racial distinctions: The European in Asia (whether as adventuring cyclist or pomp-girt viceroy) is far less concerned with the racial affinities of the villagers than with their laws of hospitality or exclusion, their customs of eating and lodging; Dr. Talcott Williams touches race questions but lightly on his way to the far weightier questions of intertribal traffic and international commerce; Mr. Barrett passes easily from the practically immaterial race-bonds of the Far East to the vital relations arising in industries, and the potent influences founded on faith; Professor Morse Stephens properly points to the racial bases of rank and caste in Indian society, but justly insists on the dominant importance of the economic factor by which the social lines have been maintained for centuries or millenniums; and Professor Grosvenor summarizes Siberian history as a series of industrial and political stages each deeper and broader than the last, and all rising successively higher and higher above the bonds and barriers of racial affinity. These instances are merely straws indicating the drift of thought; they might be multiplied indefinitely; and all point toward the growing mass of current opinion that there are other factors of humanity of an importance transcending ethnic features and affinities. Yet the Continent of continents cannot be comprehended in its fulness without some note of the indigenous races; and with a single exception the races of Asia are practically those of the world.

Passing over the multitude of minor details of fact and opinion, the peoples of the world may be assigned to five groups or divisions, conveniently termed races. These may be recapitulated as (1) the Caucasian or white race, indigenous in western Asia, transplanted to all parts of Europe, and now replanted in every land; (2) the Malayan or brown

race, pertaining chiefly to southern Asia; (3) the Mongolian or yellow race, of eastern and northern Asia; (4) the African or black race, pertaining chiefly to central and southern Africa, but represented by the Negrito of southeastern Asia, the Blackfellow of Australia, etc.; and (5) the Amerind or red race, indigenous to the western hemisphere, but represented in northeastern Asia by immigrant Eskimo from across Bering Strait. It is not to be supposed that these groups are so trenchantly defined as to permit the confident assignment of every people to one or another of them; neither is it to be supposed that they indicate in any adequate way the origin and distribution of mankind over the earth; primarily they stand merely for a series of types or ideals about which peoples may be arranged conveniently, with more or less uncertainty concerning those of intermediate characters. At the same time the classification has the merit of expressing, albeit vaguely, an obscure and unmeasured attribute of humanity, which may be designated race-sense and defined as that instinctive sentiment holding unlike peoples apart and drawing like peoples into ever closer unity of character and purpose. Apparently the time has gone by for far-reaching classifications of mankind by so-called race-characters; the fact that the doctors disagree so widely is in itself an indication that there is something radically wrong with the system; yet the race-sense of primitive folk, with its feebler vestiges among even the most altruistic and philanthropic of mankind, is a factor with which the student must reckon, a trustworthy pointer toward some natural law.

CULTURE-STAGES OF ASIA

In view of the overwhelming and ever-growing opinion that there are weightier factors of humanity than racial affinities, it behooves the student of human Asia to find some better way of classifying and describing the vast and variegated population of the great continent. Fortunately, such a way is at hand; it was developed through researches among the aborigines of America, mainly by Powell, and forms the basis of what has been called the New Ethnology—a science differing from its prototype in that it deals with men as human beings rather than animals, defining them by what they *do* rather than by what they merely *are*. The classification is based on culture, using this term in a sense so broad as to include all that mankind know, all that mankind do.

Now when the multifarious facts of knowing and doing are first assembled and then assorted by similarity, certain kinds of knowledge and actions (or of activities, if a single term be used to denote both knowing and doing) are recognized, namely, (1) knowledge and actions pertaining to the arts, or esthetic activities; (2) knowledge and actions pertaining to industries; (3) knowledge and conduct connected with convention or law, and collectively constituting the social activities; (4) knowledge and practices involved in speech and writing; and (5) opinions and observances connected with faith and philosophy, or sophic activities. So, in brief, all that men know and do (and hence what in active sense they *are* in the visible economy of the cosmos) may be summed as pertaining respectively to arts, industries, laws, languages, and systems of faith or opinion. Furthermore, when the numberless facts pertaining to each great activity are assorted by similarity, they are found to reveal phases which are fairly consistent among the several activities of each people, yet more or less diverse among different peoples; and by these phases of culture the peoples of any continent, or of all, may be classified more usefully than by racial affinities—for the culture-phase is the real index to what the people think and

do, to their attitude toward one another and toward other peoples. These culture-phases have the additional and immeasurably great advantage of indicating stages of development—but of that more anon.

Now the coincidence between culture and the activities (or the harmony between what men know and what men do) is so close that the culture-phases may be outlined in terms of arts, industries, and the other activities, either separately or jointly; and it is convenient and customary to define the phases in terms of law, or social organization, with due reference to the attendant faiths—for it is to be remembered that only a fraction of mankind have dissevered civil from ecclesiastical law, statute from commandment, justice from faith. Defined in this way, culture begins in that obscure phase shared by men and such animals as most nearly approach the plane of human thought and conduct (like the Bandar-log of Kipling); and this indefinite condition is followed by the well-established phases of (1) savagery, in which the sole law is the social one of maternal blood-kinship accompanied by a profound animism—*i. e.*, faith in a vague pantheon of beast-gods; (2) barbarism, in which the laws are chiefly social, in which society is based on real or assumed consanguinity traced through the paternal line, and in which sun, fire, and other impressive nature-objects are personified, either as beasts or as men, and added to the pantheon; (3) civilization, in which the laws relate primarily to territorial and other proprietary rights, while the beliefs are more or less completely spiritualized, the civil and ecclesiastical functions more or less completely divorced; and (4) enlightenment, in which the law is based on the right of the individual to life, liberty, and the pursuit of happiness, and in which faith works as a moral force. The first two of these phases represent tribal law, the last two national law; and it is especially noteworthy that throughout all tribal culture the law is dominated by faith, while in national culture faith is blent with, or controlled by, the principles of justice and right established by experience.

Classified by culture-phases, human Asia loses nothing of her supremacy among the continents save at a single point; three of the great classes are represented among her peoples, two of them (barbarism and civilization) more numerously if not more typically than elsewhere on earth; she lacks only indigenous enlightenment—that broadest phase of culture which all the world awaited until it budded in Switzerland and blossomed in America.

PEOPLES OF ASIA

In the light of this classification the first large question as to the peoples of Asia is easily answered: They comprise an assemblage, with more or less intermixture, of all the world's races; they comprise a few tribes of lowly savages still clad in leaves, still fearing and worshiping beastly associates, still clinging to the beastly diet of raw fruit and flesh, still dreading contact with alien men and broader culture; they comprise also the world's best and largest examples of barbaric life, from its poorest squalor to its richest pomp and circumstance; and they comprise subjects of monarchical nations of nearly every known type from pettiest principality to most resplendent empire.

In the light of the same classification it would be a simple task to answer together the second and the third great questions as to human Asia—*i. e.*, Where are the peoples? How do these peoples live, move, and have being? But such is the vastitude of the queenly continent, the magnitude of her population, the multitude of her tribal and national divisions, that the full answer would in-

evitably reduce itself either to a mass of statistics, or to a catalogue of facts summarized in every encyclopedia, even in scores of school geographies—the facts are literally, in the phrase of the auctioneer's bill, "too numerous to mention." Yet facts of object, place, and agency too many for statement but form a chaos which all scientists of recent years concur in reducing—or at least in seeking to reduce—to the order suggested by the fourth nature-question, Whence? And this inquiry is answered by a statement of the facts in terms of genesis, growth, evolution, or (to use the broadest term of all) development. The genesis of the primeval Asian is indeed lost in the haze of prehistoric antiquity, or even worse enshrouded in the mists of myth-burdened tradition; yet the sciences of geology and archeology and ethnology, on the one hand, and critical history interpreted in their light on the other hand, combine to illumine in some degree the obscure problems of early man. So, too, the chains of developmental succession among the races and peoples, tribes and nations, of the great continent are regrettably incomplete; many links are lacking even from the longest, while some are too short to give good ground for confidence concerning their invisible portions; yet all are sufficiently consistent in trend, and so far accordant in direction with those found in other lands and among other peoples, as to render them worthy of tracing.

A BIRTHPLACE OF MANKIND

Most, or all, of the leading naturalists and anthropologists of the day agree fairly as to a probable birthplace of *Homo sapiens*. Ernst Haeckel, the foremost German naturalist of his generation, assumed that the human species originated in a now submerged region between India and northern Africa, known as Lemuria, the land of the lemur; Brinton, recognizing the vestiges of mountain life in the morning of humanity, looked to the upland zone stretching from the Alps to the Himalayas, and especially to the western part of this belt, as the home of man primeval; Keane finds suggestions of four birthplaces for so many widely distinct race-stocks, but locates all in the same quarter of the globe; while other students, impressed by the evidence of lowest savagery that primeval man must have been both arborean and orarian—both forest-dweller and shore-dweller—and impressed also by the archeologic evidences of antiquity in southern Asia, have regarded the shores of Indian Ocean with its affluent bays as the region of earliest human development. Within a few years these inferences have been strikingly corroborated by the discovery of the long-mooted "missing link," *Pithecanthropus erectus*—upright monkey-man—in late Pliocene deposits of Java by Eugène Du Bois. This discovery was of prime importance to the scientific world, and especially to the student of Asia, on various accounts; in the first place, the bones are more nearly intermediate between those of Homo and those of the higher subhuman anthropoids than any skeleton known before; in the second place, the geographic position of the fossil serves at once to verify previous inferences and to locate more clearly than any (or indeed all) other evidence the home of a human prototype; while, in the third place, the deposits in which the remains were found afford the most trustworthy record of the geologic age of a Homo-like creature thus far obtained.*

So the *Pithecanthropus erectus* of Du Bois gives the starting point for the tracing of human development on the Continent of continents; the testimony of the fossil is supported by other scien-

*The most accessible and satisfactory account of this fossil may be found in the Smithsonian Report for 1898, pp. 445–459, pls. I–III, figs. 1–4.

tific evidence already written in entire volumes; and when interpreted in the light of known human development, it is in significant harmony with the world's oldest lore and earliest literature—for it marks the quarter of the earth glorified as the place of creation in the traditions of the Far East, in the Sacred Books of the East, in Hellenic mythology, in the more mystical portions of the Koran, as well as in our own Classic of the Ages, and in the belief of most of humanity. The prevailing faith of mankind is not, indeed, of a kind with the testimony of rocks and fossils; yet the dusty evidence is enlivened by its harmony with the essence of knowledge summed in the coincident traditions of many peoples.

COURSE OF HUMAN PROGRESS

In tracing the obscure trails of early human development, it were well to avoid a notion instinctive to all mankind, fostered by hero-worship and honorable regard for worthy grandsires, kept alive by the unassailable doctrines of biology, and adopted by every anthropologist at the outset of his career (and dropped only by part of them as their studies progress)—*i. e.*, the notion that the human genus necessarily sprang from a single parentage, necessarily arose in a single place. The fact that the genealogic tree of the biologist is the antithesis, or reverse, of that of the genealogist, receives too little attention: the one begins with a known or assumed primordial form, and divaricates and diverges forward in time to a diversified progeny; while the other begins with a certain descendant, and bifurcates and expands backward in time to a diversified ancestry. Now the dominant fact of anthropology—the fact attested by every experience and denied by no observation—is well illustrated by the tree of human genealogy; it is the constant *convergence* of developmental lines, whereby families are united in clans, clans blent into tribes, tribes joined in confederacies, racial lines obliterated, cities assimilated in states, and states combined in nations. The great fact brought out by the Science of Man is that human stocks, whether of blood or belief, language or industries, are not originating, have not originated since history began, and are steadily blending, running together into that great magma of humanity already encircling the globe and surely pushing into the most distant corners of the remotest lands. How many were the original races no man may say; Keane estimates four primary race-stocks, but this number might be multiplied, probably many times, without violence to any known fact or direct generalization in the entire domain of the Science of Man. The Gordian entanglement of innate notion, biologic doctrine, and anthropologic observation may not readily be undone; it suffices to sound a warning against the besetting hypothesis of monogenesis, and note the greater probability that, just as the inhabitants of India are not a people but many peoples, so the ancestry of human Asia is to be traced not so much to *man* primeval as to many *men* primeval scattered in separate colonies along her fertile and fruitful southern shores during the geologically near, but historically remote, period of the later Pliocene.

Beginning with the *Pithecanthropus* colony and a dozen or a score others, and assuming that the habits of the prototype stood midway between those of the higher anthropoids and surviving savages, various glimpses of the inevitable lines of development may be caught. At first the colonies were clans or enlarged families, something like those of the gorilla, more like those of the Australian Blackfellow and the American Red man, each antagonistic to all others;

in time some of these grew into the custom of interclan mating, thereby learning for the first time in the human world the great lesson of experience, that in union there is strength; in this way some clans grew into tribes, while others were either absorbed or extinguished under the hard law of natural selection—and the vestiges and proof of this stage survive today among the leaf-wearing and rat-eating savages of southeastern Asia, savages whose gods are beasts and whose worship is debasing fear. In this stage the law of organization was maternal descent—for at the outset and long after, the mystery of paternity remained unsolved. With the growth of tribes along the fecund lowlands, some were forced into the adjacent uplands, and eventually into the higher mountains; the relief from tribal pressure brought partial surcease of strife, yet demanded harder peaceful labor, sharper shrewdness in the chase, greater activity of body and mind; so that those who would purchase peace bought at the cost of vigorous exercise, yet were in due time rewarded by the superior faculty born of stressful organic function. Incidentally those who pushed highest on the Titanic stairway leading to the Roof of the World breathed the more deeply and of a purer air; the hepatic activity required to throw off the miasmatic poisons of the coast diminished, and the respiratory activity required by longer journeying and steeper climbing increased in larger measure—and thereby the excess of pigment in skin and inner tissues was eliminated, and the face of the human forbear bleached to brown, to yellow, and at last to the tinted whiteness of standards which grew as the color changed. This was but one of the ways of human beautification, whereby prognathic jaws were retracted, arms shortened, legs straightened, and the hirsute covering cast off and concentrated to the feminine crown and masculine halo—but this most entrancing of all the lines of human progress, measuring as it does the rise of young affection and the growth of human feeling, must be passed over.* Meantime strength grew with exercise and self-confidence with strength, until the hill tribesmen and the denizens of deserts made conquest of their animal contemporaries, slaying the fierce and taming the gentle, and so far made conquest of trees and rocks as to utilize them for tools and utensils; and as self-confidence grew, fear and worship were withdrawn from visible beasts, from tangible trees and rocks and rivers, and were concentrated on the remoter mysteries of sun and storm—though these were long personified as superpotent animals. Meantime, too, the problem of paternity was solved, and the law was so reconstructed as to cluster about paternal relationship. This stage in the development of the Asian people is represented today by some of the hill tribes of India, some of the remoter folk of Thibet, some of the groups about Lake Baikal; it is represented also by the world's best-known records of patriarchy in olden times.

The meaningful feature of the growth from savage clan to patriarchal tribe thus outlined is its spontaneity, its necessity; for, with the given conditions of organic structure and budding intelligence, the way from savagery to barbarism is certain and sure as the growth of the plant from its seed, as the development of the insect from egg to larva, as the flow of a river formed by highland tributaries on its way to the sea. Herein lies the lesson of the special usefulness of the great culture-phases in the classification of mankind; they may be lik-

* The subject may be pursued in "The Trend of Human Progress," *American Anthropologist*, n. s., vol. 1, 1899, pp. 415–418, and in "The Seri Indians," Seventeenth Report of the Bureau of American Ethnology, part 1, 1898, especially pp. 154–163, 279–287.

ened to the insect stages of ovum, larva, pupa, imago; they may succeed more swiftly or linger longer in coming, but under natural conditions they *must* follow their established order of growth, unless interrupted by the extinction of the stock. Nor is it to be supposed that the stages are hypothetic or uncertain; for their definition rests on the sum of observed facts not only of Asian peoples but of those of all the world.

THE RISE OF NATIONS

Now the hill tribes of Asia at first developed faster than those of the shorelands, and sent branches or isolated colonies in all directions; one of the earliest, and in all respects the most noteworthy, of the human streams trickled westward through the passes of the Caucasus and over the sands of Suez, to grow gradually into the world's greatest peoples; another branch apparently crept around the western flanks of the Pamir, and then filtered eastward to form the tribes of the Middle Kingdom, to displace the earlier comers by more easterly routes, and to grow at last into the world's most populous empire; still other rivulets flowed northward even unto the shores of the Arctic; while some of the strongest streams of blood and culture ebbed again toward the Indian lowlands, sweeping the most sluggish indigenes westward to the Dark Continent (where they doubtless foregathered with local groups) and eastward into Malacca and the great archipelago stretching thence to Australia. Yet not all of the indigenes were displaced; enough still remain to form that stratified series of peoples and cultures described by Professor Morse Stephens and defined by the world's most striking examples of race-sense—for, in spite of the economic factors, the castes of India find their roots in racial antipathies.

The story of the growth of intertribal commerce, of the Alexandrian invasion, and of the pushing of Asian influence into Europe has already been told by one of us;* the story of the welding of Mongolian tribes into a nation and empire, and of the westerly crusade aimed for Christianity but content to stop at Buddhism, has been told by another;† the story of slow confederation among the tribes of India, and of more rapid national assimilation under the influence of alien empire, has also been told;‡ while the story of the absorption of those northern tribes occupying the world's greatest woodland and tundra by one of the foremost world-powers is still fresh in mind.§ So these events and episodes of Asian development, important though they be, may be passed over.

HUMAN ANTIQUITY IN ASIA

The developmental outline of human Asia would be incomplete without some intimation as to the relative antiquity of mankind on the great continent and elsewhere. Fortunately the geologic estimate is made definite for Asia, and for other lands as well, by the finding of the fossil prototype, *Pithecanthropus*, in late Pliocene deposits; and so far as definite knowledge goes this forms the geologic and archeologic datum-point for the world. The archeologic record is consistent with that of geology, in so far as the time-measures of the two sciences are commensurate; the partly traditional history of China runs more than fifty centuries into the past, yet begins

* Dr. Talcott Williams on Western Asia; printed in this volume as "The Link Relations of Southwestern Asia."

† Hon. John Barrett on Eastern Asia; printed in this volume under the title "China: Her History and Development."

‡ Prof. H. Morse Stephens on Southern Asia; soon to be printed.

§ Prof. Edwin A. Grosvenor on Northern Asia; also soon to be printed.

with accounts of conquest over earlier peoples and with great eras* which must have begun far earlier still; the sacred books of India summarize several millenniums of history from the days when "the noble races had to struggle with the low-caste tribes, people of black complexion and flat nose, and even with the Anasikas, demons, and monkeys," up to modern centuries—and even at this beginning there were long eras, like the Kali-yug, implying traditional preservation of observations for millenniums already past; and throughout southwestern Asia and Egypt ruin is superposed on ruin, and the later ruins are so identified by records of fifty centuries and more of history as to indicate an occupation of certainly 80 to 100, and probably 150 to 200, centuries from the beginning to the present. The historical record of human Asia is long, very long; the archeologic record runs a long way farther into the past through a succession of relics and ruins beyond compare in Europe or Africa, immeasurably beyond the earliest human traces of the western world.

So, it is just to consider Asia the cradle of humanity; within her ample borders the earliest races sprang, over her shorelands and uplands the earlier culture-stages were developed, and from her plains and mountains all other lands were at least partly peopled. More than this; Asia witnessed within her own borders the natural growth of nations from crude confederacy at the beginning of barbarism to brilliant empire. Yea, and still more; Asia illumined the world with its brightest examples of ennobling faith, from the crude shamanism and Shintoism that did good service in their time, through higher and higher stages to the Golden Rule of Confucius in the Far East, to the Light of Asia in the great midland, and at last to the Light of the World in far western Palestine.

THE WORLD'S DEBT TO ASIA

On the whole, when the Continent of continents is fairly viewed in her length and fullness of history as in her breadth and wealth of land, Asia must be held at once the cradle of humanity, the birthplace of nations, the nursery of the world's religions; and all right-thinking men must hope that the debt of the western world to the queenly continent will be paid in full measure, and in peace and good-will to the men of ancient lineage, whether their skins be brown or yellow.

*Chinese chronologers reckon their history by dynasties running back to the era of Yao, beginning B. C. 2397. Still more impressive are their natural time units; for not only were the Chinese astronomers familiar with the luni-solar period (or eclipse cycle) of 7,421 lunations or 600 years, known as the Chaldean naros, long before the cycle was recognized in the west, but they conjoined this with an arbitrary period of 60 days to form the Chinese Great Year of 57,105 lunations, or 4,617 years (Bibliographie générale de l'Astronomie, par J. C. Houzeau et A. Lancaster, tome premier, première partie, 1887 [Introduction], p. 95; cf. "Comparative Chronology," *American Anthropologist*, vol. v, 1892, pp. 327–330).

THE LINK RELATIONS OF SOUTH-WESTERN ASIA*

By Talcott Williams, LL. D.

WHATEVER test, therefore, we adopt, whether we regard the differences of precipitation, weather, or plants, whether we trace the distribution of species or the wanderings of the human race—only a degree less unconsciously flowing in the channels made by the invisible walls of temperature, rain, elevation, and their joint product in the vegetable and animal world—we reach at last in man the same distribution of life more highly organized in urban conditions on the east and west, with a narrow linked region connecting them, between vast northern and southern spaces. In these the rigor or the vigor of climate and the perpetual conflict of continental areas develop single, dominant, destructive, or exclusive types, as the ocean spaces the shark, once absent from seas like the Mediterranean. The effect of this on warfare in northern Asia is perhaps best illustrated by the differing arrow release to which that observant and ingenious ethnologist, Prof. E. S. Morse, long since drew attention. As we pass from the simple primary thumb and forefinger release of the savage to the three-finger release of the Mediterranean races and on to the thumb ring of the Mongolian arrow release, we are passing through a successive development in missile weapons, of which the last represents the strongest and shortest bow and the weightier missile—the highest development which this weapon has reached on horseback. Joined to the habit of concerted action and the capacity for wide rule which the plains races always develop, whether they be the Arab of the Southern plains, the Turk or Tatar of the Northern plains, or even the Teuton of that brief analogue of the Riverine plains of Asia, which lies just north of the mountain masses of Europe, there exists, both in warfare and in predatory organization, an overmastering advantage in the races to the north and the races to the south.

If we ask why these riders have not ridden down the world about and broken this link between the development of the East and the West, it is because the bridge is protected by the dike created by the elevations extending from the center uplifts of Asia and Europe, as Professor Suess has shown perhaps more clearly than any other physiographer. When the mountain ranges are reduced as they are in his diagrammatic map to elementary conditions, it is at once apparent that a continuous chain runs from the Pamir Dagh to the end. There the curving Carpathian line loses itself in the Noric Alps at the point where the Danube breaks through and the Celtic huts of Vindobona have been replaced by the roofs and towers of Vienna. To the south this linked region is differently separated. The Pusht-i-Kuh and its continuing ranges, which for five millennia have separated Semitic and Iranic realms, lie to the north of the Euphrates River Valley, and nearly join the Armenian Taurus, which closes off Asia Minor. As a result, while the Arabian Patesi broke into this linked region in the fourth millennium before Christ, the Turkish Bey had not made his appearance south of the northern more defined dike until the close of the first millennium of our area, unless in-

* Concluded from the July number.

deed the Hittites were the early precursors of the Turks. These successive invasions of this region found there the earliest development of civilization. This, in its turn, was probably due to the early existence of the same trade which has through all modern history been the foundation of commercial prosperity and maritime empire.

It is not improbable that when all is known it will be found that the reason why the Nile and Euphrates early figure with settled institutions is because in these river valleys the slight advantage given by the opportunity to offer protection and gain tribute from the trade between the East and the West along this connecting region enabled ruler and city to secure their primitive advance over other river valleys not less well situated in climate and product, but lacking the fertilizing fruits of this stream of trade. The sacred caravan which now leaves Cairo and passes along the Sinaitic Peninsula meets the Haj from Damascus in the north and defiles southward along the earliest of these trade trails, which goes through Mecca and ends in Yemen at Aden. The reason why the ancient sanctuary of the Caaba stands at Mecca is because the city is threaded on this route. The development of Islam itself accompanied a period when the closing of the Red Sea route and the interruption of trafic across Persia forced traders through Arabia and led to the attempt of Justinian to secure new trade connections with China north of the Black Sea by way of the chain of Nestorian mission stations.

When from any cause the sea routes are interrupted the land of Arabia flourishes and Arabian expansion comes. But the more ordinary trade routes are those which pass by the Red Sea or by the Persian Gulf by diverging caravan routes northwardly to Trebizond; next due east to Antioch; and third, more ancient, by Babylon, Tadmor, Damascus, to the Phœnician cities.

Along one or the other of these routes, like beads on a string for three millennia before Christ, slipped the seats of rule over this tract from the days of Luggal-Zaggizi, always following more or less closely the shift of trade, always maintaining relations due to their independent commercial share in the Mediterranean trade, first with Sidon and then with Tyre.

The relation of these routes to the Mediterranean becomes instantly apparent in the admirable study of the physiographic conditions of this historic sea, which I owe to Dr. Daniel C. Gilman. These routes both finally reached the Mediterranean at different points along that great fissure first suggested by Professor Suess, and more lately discussed by Mr. Gregory in his lucid, illuminating, and instructive work. What might be called the germinal point of our civilization is the place at which this great rift, the largest on the earth's surface, meets the great fold, also the largest of its character, which constitutes the backbone of the Eurasian mass. The link region owes most of its relations to the circumstance that it falls in the angle between the junction of these two great physiographic phenomena. The north-and-south uplift attending this rift, which began far south of Lake Tanganyika and ends in Lebanon (the fish of their streams retaining traces of their earlier connection) creates the eastern end of the Mediterranean, just as the Mediterranean, as a whole, is a depression on the southern side of the great Alpine fold. Along this great rift were developed, first Judaism, then Christianity, and last Mohammedism, three world religions, of which the last two today alone survive among all earth's faiths with the capacity for conversion still existent. To the north of the end of this rift lies Asia Minor, itself physiographically a part of the great Asian plain, opening toward it like a funnel between the

Trade Routes from the East to Egypt

From Gibbin's History of Commerce in Europe

mountain ranges already noted, the northern dike, and the lower barrier of the Taurus. Into this funnel poured the Hittite, and across it still wander the low tents of the Kizil-Bash, kin of scattered Asian hordes.

From the very opening of history Asia Minor has always been, as to its interior, Asian, and as to its coasts, European. When Greek history opens, Greece rims Asia Minor, but its interior is full of strange tongues, faiths, and gods. Somewhere at its mid-point along the Halys the two tides of migration, one from Europe and the other from Asia, early met, for through all the historic period, as Mr. W. M. Ramsay has pointed out,[11] east of the Halys the Semitic horror of the pig prevails, while west it is an esteemed purificatory sacrifice. In some relation with this great rift valley, the trade of the East has always flowed. Wherever it impinges on Europe, economic expansion comes. This was as true when it poured through Venice in the fourteenth century after Christ as when it poured through Ephesus in the fourth century before. When the Suez Canal turned this profit-giving stream onto Salonica and Trieste, instantly the Hungarian plains awoke from their economic lethargy and made in the last thirty years a material advance such as outstrips that of most of our own western cities.

In its early stages this trade, as we have pointed out, passed from Babylon to Tyre and Sidon. There instantly followed the expansion of Phœnicia, which brought on a long struggle between Greece and Persia. This, in the phase to which Marathon, Thermopylæ, and Platæa direct attention, was a struggle for the conquest of Greece. In its wider and more enduring battle, it was in a truer sense a wrestle for the trade of the Mediterranean. The shock of conflict was decisive, not on land but at sea. Themistocles and Aristides, Gelon and Theron are the real heroes, and the

[11] W. M. Ramsay: The Historical Geography of Asia Minor, 1890, p. 32.

bays of Salamis and Himera the real scenes, of Greek triumph. Early a few Sidonian colonies had been scattered along the northern shore of the Mediterranean. Wherever these seamen landed they left some mark of the worship of Astarte and of the strange vice of a seafaring coast to corrupt for all the future the space wide-scattered from Corinth to Massalia, a moral stain which not the flow of thirty centuries has wholly effaced. But after the battles in which the Phœnician, rather than the Persian, fleet and their Carthaginian ally had been defeated, Phœnician colonies were confined to the southern edge of the Mediterranean. Neither were exclusive. The earliest of Greek colonies was to the south, at Cyrene.[12] In like manner the earliest of Phœnician colonies were to the north. But the drift of both was along opposite banks of the Mediterranean. It is only at some point like Sicily, where at Girgenti the Temple of Theron, and at Monreale the Saracenic cloisters of Frederick, remind us that these eddying tides of Semitic and Aryan strife have left their early and late beach-marks side by side.

The fashion in which not only commerce but the arts spread along these routes of trade is best illustrated by the diffusion of some simple article like the majolica of Chaldea; its early examples have just been recovered by the German excavator at Hillah; its later glories are seen in the Persian archer which M. Dieulafoy brought to the Louvre from Susa. When Chosroes in the last expansion of the Sassânidæ held Rhodes, he planted there a colony of Persian potters. From them came Rhodian ware; their glaze spread through the Mediterranean; their patterns still live in the potters of Brusa. Of their ceramic lineage has sprung the majolica of Faenza and the Mauresque pottery of Spain. Over the Mediterranean basin they displaced the wares and the glaze of the Greek and Roman potter. By the hands of the Huguenot Palissy they passed from southern France to northern Europe. Of their family is the entire field of modern glazed wares, distributed along lines of trade from Susa to Staffordshire.

When the Persian archer was pictured in them he held Asia Minor and conquered Egypt; he closed to Greece and opened to Phœnicia the route of the Red Sea. The legendary peace of Cimon represents the commercial fact that no Phœnician vessel passed in to the Ægean, and no Greek vessel could safely go south of Crete. Towns like Ephesus grew and flourished and carved the great sculptured drums which stand in the Louvre and in the British Museum, under the stimulus of a trade which could only reach Greece by the Persian land routes and dubious relations. The Greek trader left these routes, and again, as ten centuries later under Justinian, Greek trade sought a route above the Black Sea, and the Greek colonies of Euxine had their brief period of bloom prior to Alexander.

When the expansion of Greece came under Alexander, the linked area which we are considering had been for nearly two centuries under the control of the Persian Empire. The organized rule which had established itself early in the Nile and still more in the Euphrates Valley, as important for trade routes as they were for the fertility and security which they offered for agriculture and the basis they furnished for the development of trade, had in both cases been expanded beyond its original area. In the case of the eastern valley it had been replaced first by successive waves of invasion from the plains to the south, from the days of Hammurabi certainly and probably earlier, and next by the

[12] Etablissements et Commerce des Phéniciens. Lenormant Francois Atlas D'Histoire Ancienne De L'Orient. Planche XX.

Greek Colonies. Gibbin's History of Commerce in Europe.

Assyrian rule, with its steady commercial policy, its continuous extension along trade routes which stretch to the westward, the more northern toward Antioch and the gates of Syria, the more southern to the Phœnician cities—always extending along these lines by annexation and by treaties manifestly intended to control trade. All these early areas had been engulfed by the Persian realm, which, as was later to be repeated under the Abasside Caliphate, held all the channels of trade, the southern by sea and land on either side of the Arabian Peninsula, the great mountain routes which descend from Balkh or from Cabul, and the lesser lines of travel which reach the Persian plateau. Open to trade and travel as these were, the Phœnician exclusion had turned the steady stream of Greek traders toward the Bactrian routes and those which reached the Indus across the higher passes of Asia. The direct routes were impeded. The commerce which in the second and the first half of the first millennium before Christ had made Naucratis and the other Greek settlements in Egypt centers of a trade which fed the obsidian works of Delos and enriched the buildings of the Peloponnesus with the work of Egypt and Phœnicia was closed. The Greek trader was present only by sufferance on the caravan routes of Mesopotamia. Nothing so proves the extent to which this trade was diverted to another channel as the wealth of gold ornaments which the spade is perpetually turning up, all made within a comparatively narrow period, in the brief existence of Greek colonies in the Tauric Chersonese and the adjacent mainland. When in his easternmost campaign Alexander was moving with the skill and certainty of a man maneuvering and marching in an accustomed region, it was undoubtedly because his army was thick scattered with Greeks who in trading expeditions had threaded all the defiles which enter Bactria to the north or debouch upon the valley of the Indus.

His campaigns throughout are marked by that intelligent and instinctive knowledge of physiographic conditions which marks the great commander and sets him apart from the mere winner of individual battles or the mere leader of a charge. It was because Alexander added this power to those other two, both of which he had as only a few men have ever possessed them, that he stands alone in all the surge of conquest which has ebbed and flowed over the narrow region which joins the east to the west. He began by winning at the Granicus, the entrance to eastern Asia Minor, wasting no time upon its internal conquest, an error from which Cæsar later was not wholly free, or his work would not have been so soon undone. He struck straight for the heads of the great trade routes, passed around Asia Minor, fought his great battle at the very point where, as has already been indicated, the great rift of the south meets the rounding curve of the outwork of the great system of mountains which divide into two great channels the course of Eurasian history north and south, halted only for two great sieges—one of Tyre, where he redressed the long exclusion of generations from the trade of the Levant, and the other of Gaza, which owed all its importance, its garrison, and doubtless the selection of a commander of the ability of Batis to its position at the head of the trade routes through the passes of Arabia Petra. Holding the ends of the land routes, he turned aside, and founding Alexandria, established the supremacy of the Greek trader for nearly five centuries over the Red Sea. Alone of all men who have struggled for this region, Alexander seems to have divined that his work could not be complete until he had pushed his boundaries to the emtreme limit of the physiographic territory which we are considering. His

eastward march, the Aryan at last on the bridge, carried for the first and only time in history the supremacy of European ideas and organization over the entire space which constitutes the inevitable link between the three groups of population which, from the nature of things, constitute the three great hives of the human race in the Eastern World. The far-flung line of Greek cities which he left starred the whole region with spots and dots of enlightenment, free colonies extending to the Indus and the Oxus. So completely has this perished and left no trace that it is not easy for us to realize that for over a century and a half Greek coins were being struck in Bactria, that Buddhist sculpture received a form and comeliness which has never left it and which places it alone among the bizarre modeling of the East. It is as difficult for us to understand that for three centuries a great Greek city like Seleucia, with its own assembly and council, its agora, and its Boulé, maintained itself on the Tigris. There is something invincibly pathetic in the disappearance of these cities one by one like guttering candles. Their glory,

> Like the shooting star,
> Fell to base earth from the firmament.

These Greek cities had no land or rural cultivators about them. In the ancient city the death rate was steadily higher than the birth rate. As fresh supplies of Greeks ceased, it was a mere question of brief generations when the Greek lines were extinct and the effort to hold this tract for civilization faded and was lost first in the Arabian and then the Tatar migration.

ROME AND THE ROMAN EMPIRE

The successor of Greece, Rome, was a sea power. Its first treaty was a commercial compact with Carthage. Its conflict with that maritime power was really a struggle for the basin of the Mediterranean. In its zenith the Roman Empire was a rim of land about the Mediterranean, with an outlying region like South Britain, but limited always in the full exercise of its power by its command of the great sea. When Augustus fixed the policy of the Roman State he adopted a new practice in regard to these great trade routes, which were the arteries or connecting ligaments between the East and the West. They were no longer left wholly in Asiatic hands; neither was the effort made to hold them from end to end. An expedition of Augustus seized Aden, but left it. The police of the Red Sea was maintained, but the effort was not carried farther, so as to hold its entrance, and trade from south Arabia to Zanzibar was allowed to grow. The Persian frontier was expanded so as to grip Palmyra because it was the end of one caravan route. Its great colonnades in the desert marked the wealth of this outpost. The carved Roman fronts of Arabia Petræa, a tract always held by a strong imperial garrison, was the head of another route. Later Dara was the fortified fort and outpost which protected the heads of the divergent caravan roads which came up the Mesopotamian plain and then separated. Here, as along the line of the Rhine and Danube or the southern edge of north Africa, strategic points were held, but no effort was made to expand beyond them until the period between Trajan and Heraclius.

When this advance came the Arab expansion was near. It had been preceded by causes which prepared the way. Augustus' policy of holding the heads of the trade routes, instead, as under Alexander's far-sighted plan, of garrisoning the routes themselves with a long line of Greek cities and settlements, divided the springs and sources of control over a region whose free transit was indispensable to the health of each member of the human race whose trade it carried. The Roman fringe from Tra-

pezus, Erzerum (Arx Romana) to Alexandria, through Antioch and Palmyra to the carved cañons of Petræa, grew in splendor and in wealth. As long as the Parthian policy left Seleucia and her sister Greek cities in touch, the trade around the Arabian peninsula was unvexed by the Arabic dhow. The Greek trader was in all the waters about Arabia. These conditions disappeared under the more rigorous administration of the Sassanidæ, and the Greek cities withered. The Arab expansion into Abyssinia, possible under the policy of Augustus, an expansion which so narrowly transferred the birth of Islam from Mecca to this mountain plateau, was accompanied by the spread of Arabian commerce around Asia. A century later the Chinese junk was a frequent visitor in the Euphrates, and the hongs of Arabian merchants at Canton preceded by 1,000 years the like and later establishments of north Europe. The trade of the Red Sea was replaced, as it had been preceded, by cargoes debarked at Aden and following the northern routes which passed through Mecca, and whose farther journey Mohammed more than once shared.

Whenever from any cause the Red Sea became closed, or when, early, the vessel of the day was incapable of the long trip around the Arabian peninsula, then always as in Himaryitic and earlier days, southern Arabia becomes an organized monarchy because enjoying the revenue of this trade. The line of sparse settlements which follows the extinct volcanic heights of the great Rift along the eastern shore of the Red Sea springs into an activity which in the seventh century burst forth in the explosion of Islam. The outlines of this outburst are familiar. Under it this entire region, with the exception of Asia Minor, was in the hands of a rule centered on the Tigris, as ten centuries before at Nineveh or Babylon; but since the Mediterranean outposts were no longer, as for ten centuries past, under alien hands, Greek or Roman, the Caliphate exceeded in power and in splendor the two Asiatic rules which, without this aid and vantage, had preceded it in the same valley.

One fatal change, however, came. This inroad from the southern plain swept across the dividing line of mountains in north Persia and pushed what, remembering its results, may fairly be called a sluice into Tatary. The province which stretched down the Oxus, Ma-wara-l-nahr, made the first open communication between the great plain to the north and the valleys and plateau to the south. Under the Samanids it felt Persian civilization, Arab learning, and Moslem faith. There begun that steady migration, first of Turkish slaves to the court of Baghdad and later of the Tatar horde, until there burst forth all

> The black Tatar tents which stood
> Clustering like beehives on the low, flat strand
> Of Oxus, where the summer floods o'erflow
> When the sun melts the snow in high Pamir.

The results of these successive invasions, Seljuk, Turk, Tatar, or Mongol, in all its hideous forms, spread terror, desolation, and lasting death and decay from the Pacific to the Mediterranean. It broke all the channels of trade, interrupted the connected development between the East and the West, which had been slowly developing through nearly four millennia, and played no small share in causing the arrest of the Mediterranean basin, which had for nearly seven centuries but the fitful light of a dying civilization in which a new faith was making its way, *ducente deo, flammam inter et hostes.*

Its growth led to an attempt in the crusades to stay the joint progress of Arab and Seljuk, for the men of the flatlands south and north had both overspread the region between. Meanwhile the currents of trade were moving again to the north of the Black Sea, southern

routes being closed, and this trade was doing its share to awake into consciousness the vast inert mass of wandering men in the northern Asian Plain with results later apparent. The only fruit of the shock between the East and the West from Nicæa to Edessa, from Edessa to Montroyal, was to leave no one eastern power equal to the eruption of the Mongol swarm when it burst on the world just after the close of the crusades. These hordes from the north had poured through the open gate which the extension of the provinces of the Caliphate into Transoxiana had provided. First the Turkoman of the Oxus came, later Chingiz' Mongols, in the center of the Northern Plain, and last the more civilized organization of Timur. From Novgorod to Pekin, over the entire stretch of the Great Plain in which the Urals are so small an interruption; from Siberia to India, their descendants ruled.

Their only check came in the Ayyubid dynasty, founded by Saladin, which the crusades had consolidated, and which held the ends of the trade routes that found their way up the Red Sea and across the caravan routes to the ports of Syria. In all the annals of the relations of this region, for the first time the Asian swarms closed all the traffic by land. The route north of the Black Sea, which had so often been opened when all others were shut, was in their hands. The lines which passed across Persia were blocked by all the internecine feuds whose rapine darkens the Quatrains of Omar. Instantly a new relation was established. The real close of the crusades is the treaty between Venice and an Ayyubid Sultan of Egypt, Adil, 1208, by which the city of the Adriatic obtained a monopoly of the trade of the East. Straightway there arose in Cairo and every Italian city those buildings, the mosques and tombs of Ayyubid and Mameluke sultans, and the churches of the later Romanesque and earlier renaissance. In every age, wherever the opportunity of levying toll upon this traffic between the East and the West comes, there also buildings rise and a new architecture is born—from the Ziggurats of Babylonia to the dome of St. Paul's, itself the first fruits of that growing trade which marked England's appearance in the East. Through nearly two centuries of the free-flowing profit of Italy, the narrow duct through which flowed the trade of the East, was the open way kept by the independent government of Egypt in close communication with the small republics of the peninsula. When the Othman Sultan, Selim, in 1517, swept over Egypt the last shred of the passageway which nature has provided between the Asian and the European centers of population passed into the hands of the representatives of the northern flood which had first burst forth when Hulaku ended the civil power of the Abasside five centuries before. The flask of pepper instantly arose from six to eightfold in the markets of Europe. Sugar increased in proportion. The trade of the Italian cities was ruined. The trade routes along which the cities of central Europe had grown were swept with bankruptcy. There succeeded an economic convulsion such as always accompanies every shift in the channel of this great trade, which had no small share in precipitating the Reformation, acting not so much as cause as furnishing the occasion for the sudden appearance of a growing ferment.

First Portugal and then northern Europe, since all paths across the bridge were at last held and closed, began their attempts to find a way around the continent of Africa. Out of this attempt grew the voyage of Columbus. Through successive maritime discoveries the northern half of Europe made its connection with the Asiatic centers by sea instead of by land, and there came that fission in faith, in trade, and in devel-

opment between Teuton and Latin Europe which has so powerfully influenced modern history, one half having and the other lacking a direct route to the East. Asia remained in the hands of the men of the Northern Plain; Ming and Manchu dynasties rose at Pekin, and the Turk sits on the throne of the Eastern Cæsars. The descendants of Timur ruled in India until the English Raj, itself a product of the maritime movement which the control by the Tatar over the natural connecting link between India and Europe made necessary. If I were to select the one object in human history which sums and typifies this great march of events in the long defiles formed by nature creating and guiding its course, it would be those shivered fragments once the serpent's seat of the Pythian oracle at Delphi—the spoil of the Persian when he first made Asian the coast of the Ægean, won by the Greek at Platæa, for seven centuries the seat of prophecy, and when "Apollo from his shrine can no more divine," transferred by Constantine to his new capital, at last the trophy of the Turk when the last of the Constantines fell in the breach broken by the mace of the conqueror as he rode into the Hippodrome.

Not until the Russian railroad crossed the plain east of the Caspian and extended itself to the Pacific had civilization its full revenge and established across the plain, whose folk had so long closed the connection between the East and the West, another sure pathway. With it the history of this central region enters on a new chapter and becomes secondary in its relations. Today it only plays its part in that wider duel extending over civilization between the approach to the eastern centers of population of the Russian railroad and the English steamer, the division of Asia between Slav and Briton. But through all its history the same continuous thread has run, which has made it the connecting link between the three great groups of population in the Eurasian mass, and, beyond any other of earth's tracts, it has had as its share and part

Res gestæ regum ducumque et tristia bella.

The Roman Empire

From "Europe," by Elisse Redus

THE OLD POST-ROAD FROM TIFLIS TO ERIVAN

By Esther Lancraft Hovey

THREE hours by rail east of Tiflis, in Transcaucasia, lies the little hamlet of Akstafa, which has been the northern terminus of the post-road to Persia by way of Erivan since the completion of the Transcaucasian Railway. It is a wretched village, and what little importance it has enjoyed for some years will soon disappear, since it is far away from the line of the railway which the Russian government is about to open from Tiflis to Kars, one link of the great chain which is to stretch through Erivan to Tabriz and the Persian Gulf. The advent of the railway will render easily accessible a picturesque and interesting region which is now rarely visited by tourists, and will eventually make familiar to many the marvelous beauty of the Mountains of Ararat.

Our party for the journey across Russian Armenia consisted of several members of the great International Geological Congress which met in St. Petersburg in 1897. We gathered at Akstafa early one beautiful morning late in September to begin our long ride southward to Mt. Ararat, our objective point. When we finally sallied forth from the post-station our caravan consisted of four comfortless carriages and a baggage wagon, under the protection of a military guard of six Cossacks in full equipment. We had been warned that traveling in this part of the world was dangerous, and we could well believe it when we saw the armament of these men. In addition to the regulation rifle, short sword, and ornamental powder pockets, they wore belts fitted with ball cartridges and two or three extra revolvers in the most convenient places for instant use. The most conspicuous part of their dress was the *bash-kil*, which is a simple hood made of scarlet cloth, with long streamers. This was usually worn with the streamers crossed over the breast and tied at the back, the hood hanging on the shoulders. The *bash-kil* is a very useful article of dress in a climate subject to the sudden extremes which occur in Armenia and the Transcaucasian Mountains. After sundown the hood is drawn over the head beneath the fur cap, while the streamers are wrapped around the throat to keep out the sharp winds.

The Cossacks form a kind of semi-volunteer military organization, their services exempting them from certain items of taxation. The governor of the district is obliged to furnish a Cossack guard to travelers demanding protection, and this guard is supposed to serve gratuitously, but we noticed that when we changed guards, which took place about once in two hours, our leader handed the head man of the band a handsome fee. The changing of the guard was always accompanied by much saluting and some maneuvering.

For several miles our ride across the plain was dusty and uninteresting, except for the exhibition of fine riding given us by our Cossacks, who looked very picturesque with the streamers of their *bash-kils* floating in the wind. From time to time we met strange vehicles, and as we began to enter the mountains, following the valley of the Akstafa River, we encountered villainous-looking gypsies who had to be beaten away from our carriages by the guards, so persistent were they in their demands for

Our Guard of Mounted Cossacks

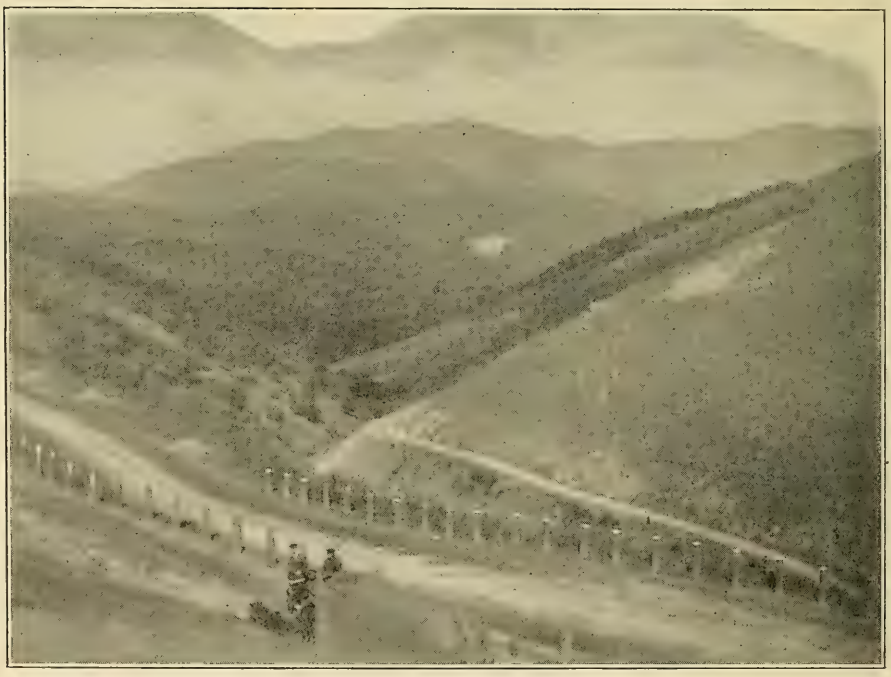
money. Nor did the tales related to us of recent exploits of brigands along this road lead us to regard these gypsies with very high favor.

We had entered the home of the Oriental rug—in fact, we were on the borders of the Carabagh country—and we soon began to understand the process of making them "antique." Beautiful rugs are used in fastening loads on to camels and donkeys, leaky roofs are mended with them, and people use them in place of chairs or beds in the houses, on the streets, and while on a journey. At Caravan-Sarai, in the Anti-Caucasus Mountains, we espied an especially pretty one on a bench, and asked the man who was sitting on it how much he would take for it. Twenty roubles ($11) was his price. On general principles we offered him ten, but he shook his head. His neighbors at once perceived a chance for a trade and flocked around us, each one offering his rug for sale and descanting upon its merits—at least, we took for granted that that was what they were doing, for we could understand scarcely a word of what was said. Indifference is the price of success in this kind of bargaining, and we walked through the village apparently paying little attention to the numerous rugs held out to our view. The first man, who had the rug we wanted, kept following us in the crowd, deducting a rouble every time we made a move to look at an attractive rug, but our invariable reply to him was "Desyat roubli" (ten roubles). Not until we started for our carriage did the other people despair of selling us anything, and then they all turned upon number one, urging him to accept our offer. It was funny to watch the men, for they are so excitable and use gestures to such an extent that one can almost understand them by these

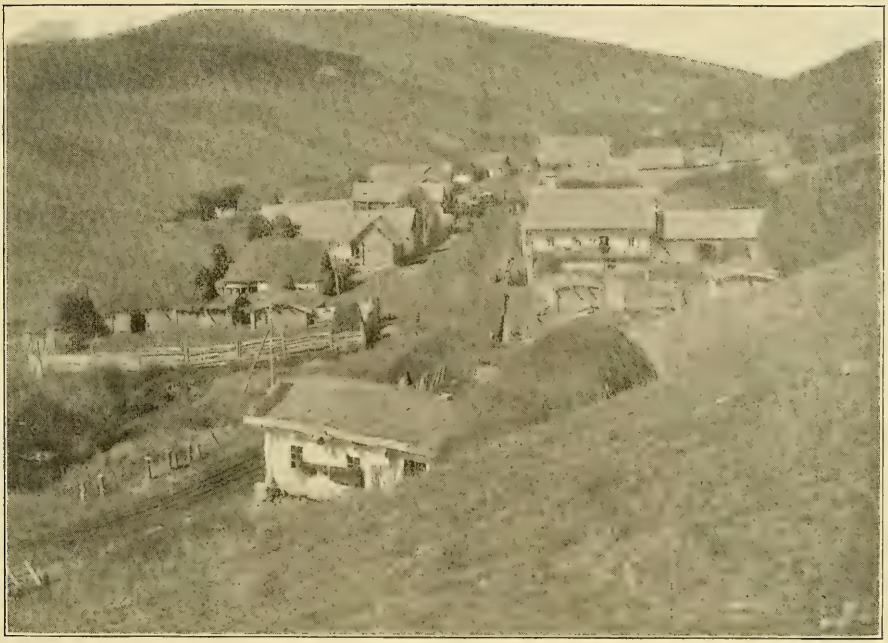
alone. At last our man came forward with his rug, asking piteously for twelve roubles, and we compromised on eleven. His sharp Armenian instinct served him well at the last, however, for he suggested so ingenuously that the boy who rolled up the rug ought to have twenty kopecks (eleven cents) for his services that we could not resist the appeal.

Late in the evening of the first day we arrived at Delijan, a picturesque little village at the foot of the pass of the same name, and as we looked across the Akstafa Valley we could see what most of the United States contingent of our party had never seen before—the lights of a large camp of soldiers who were in active service. Delijan is the military headquarters of a district. The principal house of the village was thrown open for our accommodation, and we were settled for the night on beds and benches and on mattresses placed on the floor in the house and in the barn. The seven ladies of our party were put into the best room, which was so small that some of them had to retire before all the beds could be put into place. A fifty-mile drive in the mountains is apt to produce sleep under any circumstances, even if there are seven people in one small room and two of the beds fall to the floor during the night, and one of the occupants of the room has such a severe cold that her breathing sounds like the exhaust of a steam-engine and another has the nightmare!

Three o'clock in the morning came all too soon, but we had to arise to continue our journey. It was bitterly cold and many of us performed our toilets with as little ceremony and delay as possible, but others showed the influence of long and stylish habits. I saw one gentleman of the party, a noted English geologist, out on the porch



The Mountains Looking Northeastward from the Pass of Delijan



The Village of Semenovka

kneeling before a chair on which he had set a glass of cold water and a pocket mirror, shaving himself by the light of a coiled taper. The job was so well done, however, that it was evident that he had shaved under difficulties before. Later, when we were in the hot, arid country where water is so scarce, I learned that a half cup of water could serve for the toilet purposes of this same gentleman and his wife and still furnish him enough for his shave.

By sunrise we had had our breakfast and were on our way up the pass. As we climbed higher the view became wilder and more extended. At one time we could see ten zig-zags in our road below us, while above and around were snow-capped peaks and grassy slopes, on which the light of the rising sun gave effects which well-repaid us for the exertion of an early start. At the summit of the pass there is a great change in the character of the scenery, and as we looked toward the south, instead of the heavily wooded and grass-covered slopes through which we had been coming, stretched out before us we saw the great Armenian plateau, above which rises the barren cone of many an extinct volcano. For some miles our route lay along the shores of Lake Goktchii, a beautiful sheet of water 53 miles long by 23 miles wide, the surface of which is 700 feet above the top of Mount Washington. The region is inhabited by the adherents of several religious sects. From this region come a portion of the Dukhobortsi, of whom so much has been said of late years because of their emigration to British Columbia rather than give up their religious tenets, which forbid their bearing arms for any reason. The followers of another sect subsist entirely upon milk during Lent. We stopped at the little village of Jélénovka, on the

shores of the lake, and were entertained at dinner by the Molokani, as the members of one of these sects are called. Our repast was quite elaborate for that part of the country. It consisted of soup made from corned beef and cabbage, all being served in one dish, with whipped sour cream as a sauce; fresh trout from the lake, and boiled chicken. The last would have been very delicious had it not been for the sauce of sour cream and horseradish, which gave it a flavor which none but the educated taste could appreciate. One of the desserts consisted of watermelon, muskmelon, and pears cut into small pieces, mixed with grapes and plums, covered with a hot syrup and served in hollowed-out segments of melon rind. Grapes and melons grow to perfection in the irrigated fields on the Armenian plateau.

While passing through the village I had stopped to look at a very cunning baby, but what was my surprise during dinner to be told that I was wanted by some peasants in the front yard. There I found lined up before the door, under the generalship of the mother of the baby I had admired, several women dressed in their best Sunday clothes, and each one with a highly polished and carefully dressed babe in her arm. Never having attended a baby show, I can safely say that this was the proudest set of women I had ever seen. Unfortunately these people are very superstitious, fastening blue beads not only upon their children, but also upon their animals, to ward off the evil eye. They were afraid of my camera, and departed hurriedly when they saw it pointed their way, only three succeeding in making politeness overcome fear.

For many miles after leaving the lake there was not a tree or a shrub to break the monotony of the scene as far as the eye could reach. The plain is a dreary waste of ancient lava. The houses oft-

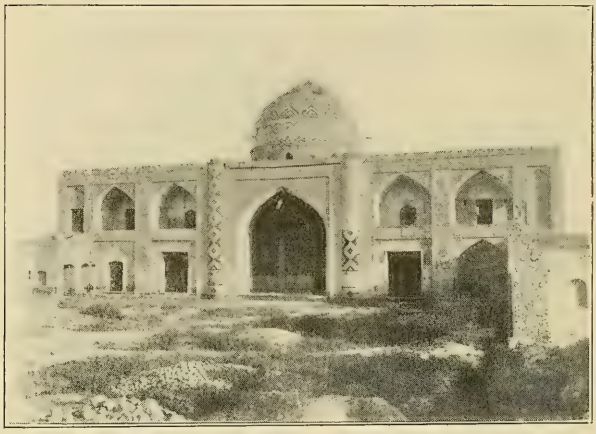
At Jélénovka

An Armenian Household

entimes are built on the slopes of the mountains, and of the blocks of lava in such a way as to be almost indistinguishable therefrom at a short distance. The dwellings are made mostly one story high, with flat mud roofs, and often are surmounted with piles of straw. This straw, as we soon observed, is put to a curious use in the making of fuel. It is cut up and mixed with the manure as that is taken fresh from the stable. Cakes about ten inches in diameter and two or three inches thick are made from this mixture and plastered on to the sunny side of the house to dry. When thoroughly dry they are piled up in pyramidal and conical heaps beside the front door, usually reaching far above the tops of the dwellings. These great piles beside every house make a striking feature of the landscape, and incidentally indicate the wealth of the householder and the desirability of his daughter's hand in marriage.

The house usually consists of two rooms, one for the family, while the other is used as a stable. A hole dug in the ground in the center of the front room answers as a stove. The fuel is broken up and put into the hole, while from an iron rod laid across it hangs the earthen vessel which contains the food to be cooked. There is no chimney to carry out the dense smoke which this fuel makes; a simple hole in the roof serves as an outlet, and as one door furnishes light and air for both room and stable, the ventilation cannot be considered perfect. At night the people roll themselves up in rugs and sleep on the ground around the fireplace. Roads are rarely or never repaired. When a hole becomes so deep that the wheels of a wagon cannot touch bottom or there is danger of a sheep getting lost in it if it gets larger, a new road is made around the hole. If a bridge tumbles down or is swept away, the people change their route, if possible, so as to cross where they can ford the stream.

Late in the afternoon of the second day, as we reached the summit of the ridge we were climbing, the full grandeur of Mt. Ararat burst upon us, and even the most experienced travelers in the party could but marvel at the view, the peculiar colors of a sunset in an arid region making the snow-capped mountain a never-to-be-forgotten picture. The peak is isolated and dominates the country for fifty miles around. It has two summits—one, Great Ararat, which is 17,260 feet in altitude, and the other, Little Ararat, 13,093 feet high—the two being connected by a ridge or saddle more than 8,000 feet above the sea. As the surrounding plain has an elevation of but 3,000 feet, these great solitary cones are much more impressive than most other mountain masses of equal elevation. There is a belief cur-



The Ancient Mosque at Erivan

rent among the peasants that Great Ararat has never been ascended since Noah's time, and that no human being can ascend it and live. The summit has been gained, however, by several travelers, and two of our party succeeded, after much exposure and hardship, in reaching the highest point. The unfortunate death of another who made the attempt probably served to strengthen the prevailing opinion of the peasants. Little Ararat presents no mountaineering difficulties, and twenty of the men of our party climbed to its top.

Erivan, the present capital of the province of Russian Armenia, is situated on the Zanga River, about 30 miles from Mt. Ararat. It has belonged to Russia since 1827. Before that time it was the stronghold of the Turks and Persians alternately, and as a result is an extremely interesting place, containing the ruins of the palaces and fortifications of the different nations, while it remains essentially Persian in its characteristics. The lofty brick and mud walls along the river were built by the Turks, and, although formidable in Medieval times, they would certainly offer very little resistance to the attack of modern weapons, even if they were in good repair. The Persian quarter of the city is most interesting, the narrow, crooked streets and lanes, filled with men, veiled women, camels, and donkeys, presenting a curious scene. On one side of the street might be seen a barber plying his trade, holding his patient's head against the side of the house while he shaved the narrow strip from forehead to crown or dyed his whiskers that peculiar red color which all Persians affect. Opposite the barber, or perhaps beside him, one might find a public stove covered with little pots filled with mutton stew, or a huge frying pan filled with a mixture of fish and tomatoes. Here one stumbles upon an entrance to a caravanserai or khan, there upon a long, dark passage to a public bathing place, where the men

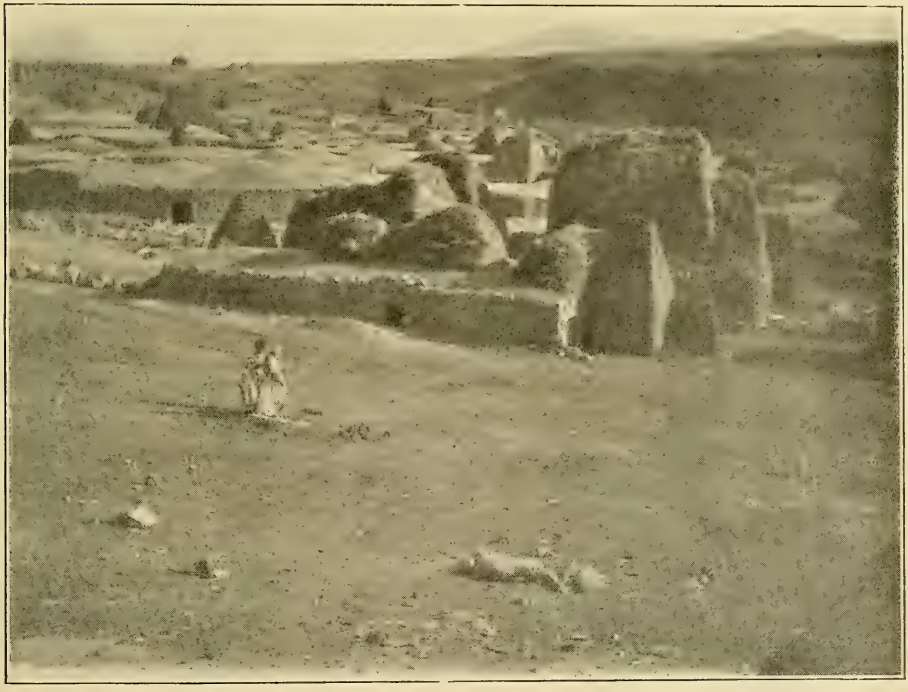
A Study in Rags

congregate to smoke, sip coffee, gossip, and bathe.

The khans are great courtyards, surrounded by barren rooms or alcoves, in which, on payment of a small sum, a traveler may make himself and his camel or donkey as comfortable for the night as his resources of bedding will permit. A small open cistern in the middle of the space receives the drainage of the courtyard, and at the same time furnishes water to the occupants of the khan for washing, cooking, and drinking. I have seen a man wash his face and hands in the reservoir while another was drawing water from it with which, apparently, to do his cooking, this, too, in spite of the presence of the pump beside the cistern.

In the hotels it seemed impossible to put down hat, umbrella, or gloves and find them in their place again. Articles would disappear, and when the proprietor was sent for and told that the things must be found at once, there would be great running hither and thither, with the resulting report that they could not have been left where you said they were. At the suggestion of police assistance, however, the articles would be forthcoming, a servant bringing them up and asking naïvely if these could be the missing articles, at the same time remarking that he had found them in a place not at all that in which they actually had been left. One gentleman of our party who had a dress hat with him besides his traveling cap had it taken from his room four times in two days, and, although he left Erivan at last with it in his possession, had not traveled far before he discovered that it was gone, and that time for good.

It was interesting to watch the natives baking bread. The dough is rolled out into sheets three or four feet long, about



The Village of Nijhi Akhty on the Lava Plain

The Village Threshing Floor at Jélénovka

fifteen inches wide, and about as thick as pie crust. These are baked either on beds of hot pebbles or in the regulation oven, which consists of a hole in the ground three or four feet deep and as many in diameter, lined with hardened clay, and narrowing toward the top, a fire being built in the bottom to heat the clay. The baker spreads his sheets of dough on a sort of pillow, and, dextrously seizing it by a handle on the bottom, bends down into the oven and spats the dough against the side, where it sticks and is baked in a few minutes. The sheets of bread are pulled out of the oven by means of a hook and hung on the walls of the shop to cool. The bread is sold by weight, the price being about one and one-half cents per pound, and is delivered without wrapping paper.

The people roll up their sheets of bread and carry them home under their arms as if they were packages of brown paper. It is literally whole-wheat bread, and though it contains no salt, tastes better than it looks.

There are two kinds of butter, one made from buffaloes' milk and the other from that of cows. The former is white and tastes like tallow, but the latter cannot be said to be as attractive or any more palatable, for the people churn it in a goat skin with the hair inside.

Each farmer seems to prepare his own grain for grinding. After the harvesting, the grain is spread out two or three feet deep on a spot of specially hardened ground, and oxen and buffaloes are driven around over it until the kernels are broken out of the heads. In some cases the threshing instrument is a

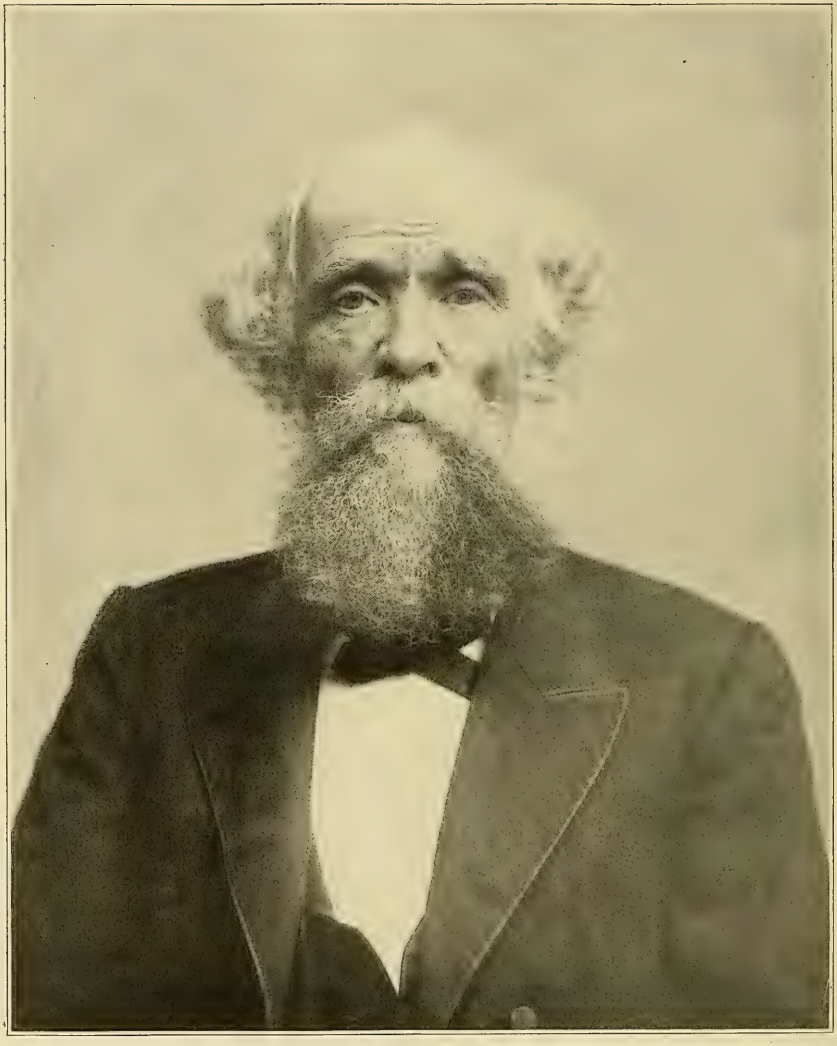
heavy oblong board, like one of our stone sledges, the bottom of which has been armed with pieces of sharp rock. The drivers of these contrivances were usually women, and sometimes they were nursing their babies as they stood or sat upon the threshing-board. When the grain has all fallen to the ground, the straw is removed and the wheat is winnowed by throwing it up into the air by means of long-handled wooden shovels, thus allowing the wind to blow away the chaff. Then the grain is gathered up and spread out on skins by the roadside or in any other convenient place to dry before being stored or taken to the mill for grinding. The millennium evidently has not come to these people, for, contrary to the Scripture injunction, they muzzle the ox which is treading out the grain by tying wisps of straw about his mouth.

JOSEPH LE CONTE

IN the death of Professor Le Conte, science loses one of her most honored exponents, the country one of her most exemplary citizens.

Joseph Le Conte was born in Georgia, February 26, 1823. He graduated from the university of his native state as A. B. in 1841, and from the College of Physicians and Surgeons in New York as M. D. in 1845. After some years of medical practice in Macon, he took a special course at Harvard under the elder Agassiz, graduating as B. S. in 1851. Within a year he became professor of natural sciences in Oglethorpe College, Georgia; later he occupied the chair of geology and physics in South Carolina College, and during the civil war he served as chemist of the Confederate government. During these early years his fame grew and spread throughout his own country and others, and his abilities shone through the war-clouds beyond those of his contemporaries with scarce an exception; and in 1869 he was invited to the chair of geology in the University of California. This important position he filled, with a success bringing him world-wide renown, to the day of his death.

The instinct of the explorer, as well as of the scientific geographer, was strong in Professor Le Conte. While still a youth (in 1844) he set out with a young kinsman to explore the then remote regions about the Great Lakes and the sources of the Mississippi; and for weeks the two were beyond settlements, out of reach of habitations save those of Indians, subsisting on fish and game, and mastering wood-craft and all manner of travel-sense—for, in addition to walking, they paddled a thousand miles in birch-bark canoes. After his transfer to the Pacific coast, Professor Le Conte continued to seize every opportunity for outdoor work; he was more intimately acquainted with the Yosemite Valley than any scientific contemporary, and explored the neighboring and still more picturesque Hetch-hetchy more minutely than any other man; and his personal knowledge of the high sierras, the auriferous foot-hills, the coast ranges, and the great valley of California was unexcelled. His taste for and experience in the actual flavored all his numerous geologic writings; to him earth-science was geography seen deep and clear. These writings are unrivalled in simplic-



Joseph Le Conte

ity and comprehensiveness—his "Elements of Geology," indeed, is beyond comparison in any language as an introduction to the science of the earth.

Professor Le Conte was geographer and geologist, and much more besides; his original researches in optics, in several lines of human physiology, and in various other subjects, raised him to the rank of authority; and he had the faculty withal of comprehending and assimilating the results of other men's work in such wise that he was at home in every field of science. In his prime when the doctrine of biotic evolution was first formulated, he contributed to its diffusion materially and with a special effectiveness by reason of his own original work, as well as his charm of personality and manifest sincerity of purpose; and one of his most noteworthy books is "Evolution in its Relation to Religious Thought" (1887). He was among the pioneers also in the acceptance and promulgation of the doctrine of conservation, one of the first to extend the principle to the domain of vitality, and the first to extend it into the realm of mentality; and he was one of the few thinkers of the last decade to consider favorably that form of the doctrine of conservation in which the persistence is conceived to inhere in the particle rather than primarily in the cosmos as a whole. In fullest sense he was a savant; and every subject touched by his versatile mind was enlivened and made clearer and more attractive by the touch. At the same time his heart reached out to every matter of human interest; he abounded in the milk of human kindness; his modesty and charity and never-failing courtesy impressed and captivated; in every respect he was one of the most lovable as well as the most admirable of men.

Professor Le Conte died as he lived, a student of nature. With a small party he returned to the Yosemite Valley early in July, for the purpose of reviewing recent suggestions as to the origin of the magnificent gorge; but the diminished air-pressure of the mountains led to a cardiac derangement, which proved fatal within a few hours. He died on July 6, at the ripe age of 78, in a little camp shadowed by the towering granite walls of the cañon he had lived to make famous.

W J M.

The German South Polar Expedition will take a full equipment of aerial apparatus to make systematic kite ascensions from aboard ship during the voyage southward and also during the months in the Antarctic regions. The *Monthly Weather Review* states that the kites "are of three sizes: the large Marvin, like those used by the Weather Bureau, of 6⅓ square meters surface; Hargrave kites, of 4 and 2¾ square meters surface, and light Eddy kites, of 2¾ square meters, which are very advantageously used in lifting and sustaining the larger kites with instruments in light winds." Probably no expedition has ever made such complete preparation for the systematic exploration of the upper air conditions in South Polar regions.

The Carnegie Museum, Pittsburg, Pa., has several parties working in the field. Prof. J. B. Hatcher is engaged in taking up fossils at Cañon City, Col.; Messrs. W. E. C. Todd, D. A. Atkinson, and George Mellor are in the Maritime Provinces and in Newfoundland making natural history collections for the museum, and other scientists are at work in Western Nebraska and Wyoming.

MOUNT McKINLEY

MT. McKINLEY, with an altitude of 20,464 feet, is the highest mountain in North America, and forms the central point of an enormous and surpassingly grand mountain mass, situated at the headwaters of the Sushitna and Kuskokwim Rivers, in Alaska. The range is a portion of the Cordilleran system of North America, which follows in a general way the contour of the west coast of the continent through Alaska and down the Alaskan peninsula.

The mountain group is extremely rugged and is covered with snow and ice to within 2,000 or 2,500 feet of sea-level. Down the sides of the mountains flow many glaciers; one which flows off to the northeast is between 20 to 30 miles in length and six and eight miles in breadth, and extends to the Chulitna River, a branch of the Shushitna forming the chief source of water supply of that stream. The Chulitna River at the base of the mountains has an altitude of only about 500 feet, showing a descent of 20,000 feet in the 30 miles between the summit of the mountain and the river.

Mt. McKinley was known to the Russians settled about the head of Cook Inlet nearly 100 years ago, and was called

by them *Bulshaia—i. e.*, Big. The first American to see and publish an account of it was a prospector named W. A. Dickey, who gave the mountain its present name.*

The writer made the only measurements of height ever obtained of this mountain, in the summer of 1898, while exploring the Shushitna River with a party from the U. S. Geological Survey. For this purpose a stadia line was run up the river, measuring elevations as well as directions with a transit instrument reading to minutes. From points on this line six angles for location and elevation were obtained upon the mountain, and from these angles its position and height were determined. The plan of this triangulation is shown on the accompanying sketch map, and the following are the results :

Latitude, 63° 5′ north ; longitude, 151° 00′ west. The height and distance as determined by the various vertical angles are as follows :

Line.	Distance, miles.	Height, feet.
1	89	20,422
2	88	20,561
3	65	20,518
4	64	20,874
5	50	20,737
6	43.4	20,069

Weighted mean and adopted height, 20,464

ROBERT MULDROW.

* N. Y. *Sun*, January 4, 1897, p. 6. Dickey estimated the height at "over 20,000 feet."

GEOGRAPHIC NOTES

THE TRANS-AUSTRALIAN RAILWAY

ON June 30, 1900, there were 12,589 miles of railroad in operation in Australia, almost all owned and worked by the government. These lines hardly more than skirt the eastern, southern, and western shores of the island continent, and their entire length is small in proportion to its 2,946,358 square miles of territory. Nevertheless this railway development is remarkable when one remembers that the population is hardly more than four and a half millions, and that the country was so recently approached by colonists. Four of the provinces—New South Wales, Victoria, South Australia, and Queensland—are connected by rail with one another—that is, one can make a circuitous tour, skirting the shore, from Longreach, in Queensland, to Oodnadarta, in South Australia ; but on arrival at the latter settlement he is still about a thousand miles distant from the nearest railway station in Westralia. The latter province is thus entirely isolated from the rest of the Commonwealth.

One of the most important projects now under the consideration of the federal government aims at bringing these separated regions into communication by rail. Sir John Forrest, Federal Postmaster General and Premier of Westralia, has worked out a scheme which provides for a railway, over a thousand miles long, from Port Augusta, the western terminus of the South Australian system, to Kalgoorlie, in the Westralian gold-fields. This line would run along the edge of the Great Australian bight and traverse a region that thus far has been hardly visited except by explorers. The cost is estimated at about $12,500,000. This plan will probably be adopted by the Australian Government. The country to be traversed is reported to be generally level, requiring few tunnels or bridges. The arguments for the Trans-Australian Railway are partly sentimental, as a means to bind a future empire together. None the less is

it true that it would exert enormous influence in opening unknown regions to enterprise and would become a mighty instrument in advancing the financial prosperity of the Commonwealth.

A practical obstacle to railway communication between the provinces, or states as we must now call them, is found in the different gauges employed. Queensland, South Australia, and Westralia use a 3 feet 6 inches gauge, Victoria a 5 feet 3 inches gauge, and New South Wales alone the standard gauge of 4 feet 8½ inches. Without doubt the new system will conform to the standard.

RIVER PROFILES

AN interesting publication of the Department of Hydrography of the U. S. Geological Survey on the Profiles of Rivers in the United States has just been published and is now available for distribution. Mr. Gannett, the author, has embodied within a hundred pages the leading facts relating to about one hundred and fifty of the most important rivers and streams of the country, noting their length, drainage area, the location of water-power in their courses, their peculiarities of flow, and the nature of their drainage basins.

The rivers selected are those which are the largest in size and bear most directly upon the varied interests of the country, such as the Connecticut, Hudson, Susquehanna, Ohio, Potomac, Mississippi, Missouri, Platte, Colorado, Sacramento, Columbia, and others. The figures for the tables, showing height above sea-level and fall per mile, were collected from various sources. Some were obtained from the report of the Chief Engineer of the U. S. Army, some from railroad companies when their lines cross the streams, and some from the atlas sheets of the U. S. Geological Survey.

In the case of such rivers as the Connecticut, Susquehanna, Mississippi, and Colorado, where the surrounding country is of peculiar physiographic interest, very excellent and vivid descriptions of the leading physical characteristics are given which add to the interest and render it valuable from an educational standpoint in geographic and physiographic instruction. The pamphlet is the result of much careful work, and is the first attempt to collect and compile this information.

DRAINING THE ZUIDER ZEE

IT is more than fifty years that the project of draining the Zuider Zee has been under contemplation by the Dutch government and people. The scheme proposed would restore to cultivation and habitation a tract of land comprising about 490,000 acres. This land was submerged in the terrible storms of the ninth and twelfth centuries, and has since been lying at an average depth of 10 feet below the surface of the sea. It is reckoned that the cost of this restoration would be something like $50,000,000, but that the value of the reclaimed land would repay the cost at least three times over.

At present the Zuider Zee is too shallow for navigation, and its shores are constantly inundated and hardly better than swamps. It is proposed to construct a dike, 28 miles in length, from Enkhuizen to the River Yssel, and by steam pumps to remove the water south of this dike. Through the reclaimed area canals are to be made, with railroads along their banks. Thus distances would be shortened—Friesland and North Holland, for example, being 30 miles nearer by railway than at present.

A new province, to be called Wilhelminaland, would be added to the Netherlands, and the territory of the little kingdom would be increased one-sixteenth. Various modifications have recently been proposed in the comprehensive plan sub-

mitted by the Dutch engineers in 1870, and it is still an open question whether the entire project will be undertaken, and if so, when. The time requisite for completion of the drainage is estimated by different experts as from twelve to thirty-six years.

EXCAVATIONS OF M. DE MORGAN AT SUSA

IN a brief paragraph one can hardly do more than hint at the remarkable work accomplished by M. de Morgan, head of the French expedition, in his investigations at the ancient site of the Persian city Susa. One must read his first report, just published by the French government. He found traces of five successive settlements on the same site: First, remains of a Græco-Parthian settlement dating from the third century B. C.; under these, remains of two successive Persian settlements; then the settlement coeval with Nebuchadnezzar, and, lowest of all, vestiges of the city destroyed by the Assyrians 2000 years before Christ.

In each layer of habitation important discoveries were made whereby the world's knowledge is greatly increased. For example, in the record chamber was found an inscription giving complete details as to the corvée system in Babylonia. Other still more ancient inscriptions conveying a mass of information were unearthed in the same chamber. Specially to be noted is a finely carved stele of Naramsin, son of Sargon, going back to about 3900 B. C. M. de Morgan is at present engaged in working up the vast amount of material he has laid bare. His first report can be considered only as introductory to the volumes in course of preparation. What he has already done marks an epoch in oriental archæology.

Paul du Chaillu is on his way to Russia, where he will live for three or four years studying the great Slav Empire and its people. Mr. du Chaillu believes that Russia is entirely misunderstood in America. It is his aim to see personally the problems that confront this expanding race, and to learn the motives and ambitions that animate them. He will study and live among all classes and in all parts of the empire, from St. Petersburg to Vladivostok. Probably no American traveler since the days of George Kennan has had such liberty of action as Mr. du Chaillu will enjoy.

The United States Consular List furnishes some interesting information concerning the tenure of office of our Diplomatic Corps and Consular Service. Out of 276 persons employed in these services it appears that 190, or 69 per cent, have served for five years or more; that 37 per cent have served for ten years or more, and that 14 per cent have served for 20 years or more. Three persons have served for 27 years each, two persons 28 years, and one person each 29, 30, 32, 37, and 48 years. The average term of service of persons in the United States Consular and Diplomatic Service abroad has been 9.4 years. From the above figures it would seem that the charge that our Consular and Diplomatic Service is wanting in experience is scarcely sustained.

New French Ocean Cables.—With the desire to make French trade independent of the British cable service, the French Ministry of Commerce and Posts has lately completed the laying of two new cables. The first is from Oran, in western Algeria, to a port in Morocco. The other is from Hué, in Annam, to Amoy, in the Chinese province of Fukien, opposite Formosa. From Amoy messages from and to French Indo-China will be carried over the Chinese land lines and the Russian-Siberian wires. Thus the French Gov-

ernment will have direct communication with its representatives without the use of foreign cables. A line to Madagascar, in conjunction with the German-Dutch cable to German East African colony, and a cable from Madagascar to Lorenzo Marques are also projected.

Massacre of Dr. James Chalmers.—A dispatch from Sidney, New South Wales, announces the massacre of the Rev. Dr. James Chalmers and a party of white men by the cannibals on the Fly River, New Guinea. For more than twenty years Dr. Chalmers has labored among the natives of this large island, both as teacher and explorer. It is owing mainly to his exertions that New Guinea is so well known today. He explored the Alps of New Guinea, that range of mountains extending for 200 miles parallel to the southern coast and reaching an altitude of from 10,000 to 12,000 feet. He was also one of the founders of Fort Moresby, the present capital of British New Guinea. The Fly River, where he met his death, was explored for hundreds of miles by this intrepid explorer.

The U. S. Board on Geographic Names has published a special report containing a list showing the approved spelling of about 4,000 coastwise names in the Philippine archipelago. There has hitherto been much difficulty with the names, inasmuch as existing charts, books, maps, and publications all disagreed. Spanish charts contained either all Spanish names or Spanish names and also Malay names written according to Spanish methods. On English charts the spelling of some of the Malay names had been altered to conform to English and American methods of writing native names, and naturally numerous errors and great confusion had arisen. The U. S. Board on Geographic Names, when appealed to for advice, after due consideration, recommended that the names in current use and their spelling, as shown on the best Spanish official maps and charts, should be followed. The Hydrographic Office, pursuant to this advice, under the direction of Capt. C. C. Todd, U. S. N., prepared, chiefly from Spanish official charts, the list of names which are included in this special report of the Board. It is interesting to note that the names were approved by Father José Algué, of Manila, the highest authority in the Philippine Islands.

Remeasurement of the Arc of Quito.—A large party of French scientists have landed in Peru to begin the remeasurement of the arc of Quito, first measured 160 years ago by Bouguer, La Condamine, and Godin, of the French Academy of Sciences. As great improvements have since been made in the method and instruments for geodetic work, arcs of the earth can now be measured with an almost inappreciable error, and it will be interesting to note how closely the remeasurement will follow the first.

In 1899 the French Government dispatched a reconnaissance party, in command of Captains Maurain and Lacombe, to make a general survey of the country and to submit a plan of organization. They spent several months in 1899 in Peru, and on their return recommended that the arc be prolonged in both directions. Their plan has been adopted, and the party that has recently landed in Peru will work four or five years there carrying it out. The arc will extend over 7 degrees, or about 430 miles.

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Vol. XII SEPTEMBER, 1901 No. 9

CONTENTS

PAGE

SIBERIA. BY PROF. EDWIN A. GROSVENOR 317

GERMAN GEOGRAPHERS AND GERMAN GEOGRAPHY. BY MARTHA KRUG GENTHE, PH. D., ANN ARBOR, MICHIGAN 324

THE DRIFT OF FLOATING BOTTLES IN THE PACIFIC OCEAN. BY JAMES PAGE, U. S. HYDROGRAPHIC OFFICE . . . 337

THE BRITISH ANTARCTIC EXPEDITION 339

URBAN POPULATION OF THE UNITED STATES 345

GEOGRAPHIC NOTES 347

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Vol. XII, No. 9 WASHINGTON September, 1901

THE NATIONAL GEOGRAPHIC MAGAZINE

SIBERIA

By Prof. Edwin A. Grosvenor

My subject is in striking contrast to the subjects upon which during this Lenten course learned lecturers have spoken from this platform. Their topics have been India, China, and southwestern Asia. Under the latter term were grouped Chaldea, Babylonia, Persia, Judea, and Arabia—that is, they have pictured the empires which are most ancient and the civilization the most hoary. In graphic résumé they have described what was accomplished on the venerable banks of the Ganges and Indus and Hoang-ho, of the Tigris and Euphrates and Jordan. The very mention of those regions suggests everything that is splendid and old. The distinguished Vice-President of this Society, when he sums up what his predecessors have said and supplies all that they have omitted, will have as his topic "Asia, the cradle of the race."

My subject, Siberia, evokes no association of ancient greatness and achievement. Its meagre history is confined to the last few centuries. Rich currents of human life have never flowed across it. The past of China, India, and southwestern Asia teems with power and wealth and glory. The past of Siberia has been in almost every mind only the synonym of polar dreariness and desolation coupled with penal settlements and convict stations.

But what are India, Babylonia, Judea, and Arabia today? What influence do they in their present state exert upon the advance of humanity? Is there any indication of future or even present grandeur in the shadow they now cast upon the world's map? Even China, the long-lived empire, in whose antiquity cycles seem like years, has as its highest concern merely to exist, merely to defer for a season the dismemberment and dissolution which, however long delayed, are ultimately sure.

From them, dead or dying, we turn northward to Siberia, to that enormous tract which reaches from the Altai Mountains to the Arctic Ocean, from the Urals to the Pacific. No prophetic eye is needed, only the eye which seeing causes foresees results, to anticipate the day when Siberia itself shall be the greater Russia of the centuries which are to come.

THE TWO CONQUESTS

Prior to this great result two conquests were necessary. The first con-

quest was to bring the domain under a single master, either an individual or a nation, so that throughout the wide extent only one authority should be acknowledged. This was to be a conquest by force over the barbarians and scattered tribes which constituted its only inhabitants. It was possible whenever sufficient force from outside should be employed. The second conquest was that over inhospitable and hostile nature, over distance and climatic conditions. It was to introduce a national element and make a cold and repellent region pulsate with the warmth and energy of national impulse and life. It was to conquer the wilderness by civilization, but a wilderness which the civilization of even the recent past would have been unable to subdue. Through the centuries for this second conquest the land had been waiting. Civilization has been well defined as the victory of mind over external obstacles. Not till the close of the nineteenth century had science furnished civilization the arms for the subjugation of Siberia.

THE FIRST CONQUEST

It is of interest and significance to us Americans when recalling our colonial history to observe how while one wave pressed outward across the Atlantic another wave pressed eastward into Asia. The stream of European conquest which reached the American shores from western Europe was paralleled in Siberia by a contemporaneous stream of conquest from eastern Europe.

In 1558 the English Elizabeth began her memorable reign. That same year Ivan the Awful gave Gregori Strogonoff twenty square miles of desert land upon the River Kama, with permission to attack anything toward the east. "The Good Companies of the Don," a euphemistic name for the mob of brigands and outlaws, furnished an army. Irmak Timofeeff, the more than Pizarro or Cortez of the Slavs, became chief commander of their wild forces. Having no seas to cross, there was no need for him to embark and disembark his troops. He could always be marching on. In 1580 the brigand chief attacked and carried by assault Sbir, the capital of a powerful descendant of Genghis Khan. Ever since the province has been called Sibir, or Siberia, from the name of the conquered capital. Streams of Cossacks followed and spread in every direction from the path he had marked out. In 1649 Khabaroff, with three cannon and one hundred and fifty men, marched to the extreme east and occupied the Amur Basin. That territory then owed a nominal allegiance to China, and from it the Russian adventurers were compelled to retire by the treaty of Nevshink. Meanwhile resolute explorers and pioneers had been pushing northward and eastward all over the trackless waste which lay between Russia and the Pacific. Meanwhile in America men as dauntless and determined had been pushing westward from the Atlantic in continuous warfare with nature and the Indians.

Nicolas Nicolaievitch Muravieff was made governor of eastern Siberia in 1847. He was the son of an illustrious father and one of five illustrious brothers, all of whom served Russia well. He realized that what the Nile is to Egypt the Amur is to Siberia. It was then an almost unknown river. In obedience to his orders, Lieutenant Nevelsky made forty-five ineffectual attempts to find its mouth. He succeeded only at the forty-sixth. Herein is illustrated both the geographic ignorance of the time and the tireless persistence of the Russian.

Muravieff sent to the Chinese Government at Pekin asking permission to navigate the river. Without waiting for an answer that would probably never come, he embarked upon its bosom May 18, 1854. It was the time of the Cri-

mean War. Allied Great Britain, France, Turkey, and Sardinia were hammering at the ramparts of Sebastopol, which they finally took after a siege of three hundred and fifty-one days and the loss of over 100,000 men. In 1860 Count Ignatieff, "alone and unsupported save for Russian prestige," obtained from the Chinese Government its signature to the treaty of Pekin. Thereby the left bank of the Amur and the right bank of the Usuri were ceded to Russia. In point of fact, China in no way suffered from the cession. She had derived no revenue from the ceded territory and had never sent governors into it or exercised any control over it. None the less, that acquisition was to be so momentous in its consequences that, in comparison, the temporary check received by Russia at Sebastopol was a bagatelle. By that treaty the first conquest of Siberia became complete. In its entirety it recognized the authority of the Tsar. From the banks of the Neva north of the Altai Mountains as far as the Sea of Japan the whole prodigious tract was under a single rule. While the world looked on, Russia, almost unconsciously, was shifting her maritime base; alone of the European states, she from her continental dominions looked out upon eastern seas. Though other western nations held isolated ports and islands in eastern waters, Russia alone reached and dominated those waters by broad territorial possessions that were continuous.

VLADIVOSTOK

Though holding a coast line of many hundred miles along the Pacific, she then possessed no city or inhabited tract adjacent to a harbor upon its shores. In 1861 forty men were sent by Alexander II. They landed at the head of a bay bearing the significant name of Bay of Peter the Great, at the extreme southeastern point of the Russian possessions in Asia. Erecting a fort, with a presumption that seems amusing, they gave to the spot the name of Vladivostok, "The Mistress of the East." Other fortifications were erected, and a city speedily arose, which boasts over 40,000 inhabitants today. It is lighted by electricity and shows every indication of western progress. Its erection on that splendid and potential harbor is a typical illustration of the fruits that spring from the establishment of Russian Government in Siberia.

PHYSICAL CONDITIONS IN SIBERIA

In discussing Siberia, statements of dimension and distance confuse and bewilder rather than enlighten. It is of small advantage to dwell upon its area of over 4,900,000 square miles. If the forty-five states which compose the American Union were taken up and planted bodily in the midst of Siberia, they would be enclosed in every direction by a wide border of land. In this border territory all the countries of Europe except Russia could likewise be planted bodily, and there would remain still unoccupied 300,000 square miles, an area twice the size of imperial Germany. We have now to consider certain gloomy and repellent facts that at first discourage speculation and half paralyze hope. Only as we realize what Siberia is, only as we consider the immense disadvantages as well as the advantages of its geographic position, can we take into full account what Siberia is and what it will be. The victory of arms is complete. The victory of settled life, of laborious industry, of applied science, is but begun. But the hero who carries the sword is inferior to the pioneer, and the colonist who wars with unwilling nature utilizes its locked-up resources and compels it to serve him. The southeastern portion of Siberia is an immense plateau in the midst of mountains. Toward the west and

north it takes the form of a prodigious plain, which descends gradually to the Arctic. Plain and plateau are alike north of the fiftieth degree north latitude—that is to say, that its most southern points, except along the Amur and the Usuri and in west Siberia, are farther north than any locality in the United States. Its Cape Chelyuskin, in 77° 36′ north latitude, reaches nearer to the Pole than any other continental spur of land in either hemisphere. Shut in by mountains from the Pacific and the south, Siberia is open and without protection to the winds from the Arctic. So, scattered over its surface, are tracts unsurpassed in intensity of cold. In this regard Verhoyansk has the preëminence. Its average temperature during the three winter months is —53° Fahrenheit, while sometimes an extreme of —90° is reached. Its average annual temperature is only two degrees above zero ; yet even there human beings cling like the moss and lichens and manage to exist the whole year through. The trend of land gives a northern direction to the masses of water—the Obi, the Yenisei, the Lena, and their tributaries—which we call rivers and which for months through much of their course are frozen rather than flowing seas.

THE ZONES

The 4,900,000 square miles of territory naturally divide into three roughly parallel zones. North of an imaginary line, in general coinciding with the sixty-ninth parallel, is the zone of the tundra. Here are comprised about 1,600,000 square miles. In a part of this territory the ground is frozen throughout the year, in winter to the depth of 40 feet, yet something like 100,000 human beings know no other home than the tundra. Between the sixty-ninth and sixtieth parallels is the forest zone, covering an extent of about 2,320,000 square miles and containing a population of less than 1,000,000. The supply of timber is practically exhausted. Its fur-bearing animals render it above any other part of the globe the land of the fur hunter. Its broad rivers are packed with fish. Its wealth of minerals and metals is accessible in the very surface of the ground. South of the sixtieth parallel is the zone of arable land, embracing about 900,000 square miles in a belt nearly 4,000 miles long and from 250 to 300 miles wide. This is the Siberia which today counts the most. It is the part now being brought into intimate connection with the rest of the world. The prime requisite for its development has been inhabitants, and then means of communication and transportation. Beside unequalled capacity for the production of cereals, it is dotted all over with great deposits of coal, iron, gold, and the most useful and valuable minerals and metals. The word Altai means golden.

COLONIZATION

But in the mind of the Russian, no less than of the foreigner, Siberia up to a few years ago has meant only suffering and exile. It seemed set apart by God and the Tsar as the prison-house of the outlaw and the felon. In 1899 a ukase of Nicholas II forbade the entry hereafter of convicts and suspected persons, and thus ended its woeful old-time mission forever.

From the dawn of creation up to the present time Siberia has been waiting even as North America waited through the ages for the states that were to arise within its boundaries. In 1888 its real colonization began when 26,000 immigrants crossed its frontiers. Then 30,000 came in 1889, 36,000 in 1890, 60,000 in 1891, 100,000 each year from 1892 to 1896, then 150,000, 200,000, and now more than 250,000 annually. While excluding undesirable persons, the government adopts generous measures toward

worthy immigrants. To every family, when desired, it advances $25 for the expenses of the journey, assigns gratuitously 40 acres to each man on his arrival, and further promises to assist with a loan of $50. The only great landlord is the emperor or the state. Serfdom has never existed east of the Urals. Even political conditions, as affecting the colonist, are not greatly unlike those west of the Mississippi before the construction of the Pacific Railroad. The present population is over 7,000,000 persons. Among them are convicts and descendants of convict stock. None the less this class forms already an inconsiderable proportion. It is probably no greater, if as great, as among the Americans at the outbreak of the Revolution.

The impartial story of immigration to the trans-Atlantic colonies in the seventeenth and eighteenth centuries is not congenial to our ancestral and material pride. Nine of the colonies were officially penal stations, to which about 2,000 convicts were sent annually for many years. From 1715 to 1765 more than 70,000 such persons were sent over, among them 10,000 from the Old Bailey alone. In 1787 Botany Bay was made a convict station, that it might in that capacity replace the then independent American States. It is estimated that today in the newly federated Commonwealth of Australia through the veins of three persons out of every seven flows convict blood. In Australia, as in America, what was evil among the early settlers has been largely absorbed in the virgin political soil. Among a new people only the brave and hardy qualities tend to perpetuate themselves and to endure. So is it and so will it be in Siberia. Adullam's Cave, first the rendezvous of outlaws, became the scene and source of heroism and accomplishment unsurpassed in the Bible.

In the "Awakening of the East," Pierre Leroy-Beaulieu gives a vivid picture of the various groups of present colonists at their nightly campings, the men unsaddling the horses, the women going to the springs and preparing food, the children playing, and some old man seated by the roadside reading the Bible to attentive listeners. The stock now peopling Siberia is that from which empires are made. Partially delivered from old traditions, equal in the democracy of labor, and forced to meet new conditions and new exigencies, Siberia is to solve political problems with which old European Russia is unable to grapple. The sun of political regeneration in the Russian Empire shines from the East.

WORLD ROUTES

The currents of history are prone to follow the beds of rivers, and commerce at first wanders along the roads which nature herself has marked out. Until four centuries ago the East and the West poured toward and across the Mediterranean to reach and benefit each other with the products of their agriculture and industry. The discovery of the Cape of Good Hope and the circumnavigation of Africa forced the abandonment of this ancient route, dealt the death blow to the princely cities of the Mediterranean, and centered the world's front in the British Islands and Holland. Now we are the amazed spectators of the beginning of that which is to make the world again change its base—commercial, political, strategic, and perhaps religious. Words can hardly exaggerate the momentous significance of the Trans-Siberian Railway, a work not yet completed, and the parts already in operation not yet beyond the initial, experimental stage. Even when its rails are at last in place and Vladivostok and Port Arthur are in full connection with St. Petersburg and Odessa, and the trains conveying passengers and freight begin to run with regularity and dis-

patch between the distant termini, the incalculable consequences of the vast enterprise will be only in their beginning. Every time the whistle of the locomotive blows, in its blast is the call not to resurrection—for in that northern Asiatic vastitude there is no dead past—but to the new, first birth of Siberia.

TRANS-SIBERIAN RAILWAY

In 1891 the first coupons were issued for the building of this railway. In December, 1892, the work was begun. A highway was to be pushed from St. Petersburg to the Pacific, a band of steel 5,852 miles long, binding the extremities of the empire and over its polished track affording an unrivalled route for the commingling of East and West and of their measureless products. From Paris to Vladivostok the journey by passenger and traffic was to be made in twelve days, and later on in ten. From Paris to Pekin in thirteen days, to Hongkong in seventeen days, diminishing the expense in money and in time by a third or a half.

This railroad was to be financiered, constructed, and administered not by private enterprise but by the state. Hence its object was not by financial returns to swell the revenues of giant corporations or individual capitalists. The profit and loss account on its pecuniary side was a minor consideration. Its single design and aim was to strengthen and develop the Russian Empire, and as an ultimate result to insure that empire the dominion of the East, the mastery of Asia.

THE RAILWAY A DETERMINING POLITICAL FACTOR

As the strategic position of Russia over against Asia is unique, so is this railroad unique in its possibilities. Whatever acquisitions Great Britain or Germany now holds, or may hereafter obtain on the Asiatic continent, those possessions are remote by thousands of miles from their base, and their efficiency depends upon a difficult and precarious connection through those thousand miles of sea and land. Nor can those possessions be brought into much more intimate relation with each other and with the home empire than they already are. That is, for Great Britain or Germany or any other power to devise a political or strategic rival to the Trans-Siberian Railway is an utter impossibility. It remains, and must remain, the most stupendous agent in determining the destiny of the globe that has yet been conceived by man. It is to be maintained, as it was first originated, under the most favorable geographic circumstances which a state has ever enjoyed for the accomplishment of a gigantic undertaking. There is no assertion here that as an achievement of engineering skill this railway surpasses or even equals a trans-American railroad from New York to San Francisco, or a trans-African railroad from Alexandria to the Cape. Viewed merely as a railroad, it may in every respect be inferior to either; its trains may be less commodious or less luxurious, its locomotives less powerful or less swift, its technical management less efficient or less sagacious; but, regarding simply geographic position, having in mind only where it runs, what it connects, and what it must inevitably effect, nowhere can experience or imagination suggest a rival. The nearest approach to rivalry would be afforded by some line crossing China from west to east. But the western terminus of such a line would of necessity be close upon Russian Siberia or Russian Turkestan; it would traverse only a moribund or disintegrating Asiatic state; and whatever might be the governing board of its construction and administration, it would indirectly, if not directly, be subject to Russian influence.

RUSSIAN POWER

The Russian Empire is the largest economic unit in the world, and disposes of a larger capital than any other corporation, all under the impulse of a single will. In Siberia more than one-third of the land—that is, more than 1,700,000 square miles—is the property of the government. To open up the fields, and utilize the rivers, and work the mines, and push the industries, and swell the armies, only men are needed, and we have seen how every possible facility and encouragement is afforded by the government to the desirable colonist. The supremacy of mind over the obstacles of nature is as yet far from complete. Though man can resist heat and cold better than any other animal, he is still profoundly affected by its extremes. Science, at the rate of five or six miles an hour, can drive the ironclad of 2,000 or even 10,000 tons through ice 8, 10, and 12 feet in thickness, and between the piled-up frozen walls open a path for commerce to follow in its wake. Each coming year is to see, as each recent year has seen, some new advance over barriers once deemed impassable, some new victory over obstacles once deemed invincible. What may not limitless resources effect when put at the disposal of profound sagacity and of absolute will!

Material advancement is by no means all nor is it the chief consideration. The whole Russian political system has been built upon the broad substructure of Slavic nature as that nature has been shaped by its geographic environment. However repugnant to every instinct of our American life that system may be, it is no creation of accident or arbitrary caprice, but of the inflexible circumstances that determined its form. In new conditions in the larger area and on an even vaster scale, it is again to be adjusted in the manner most congenial and most beneficial to the Slav.

A RUSSIAN MONROE DOCTRINE

In America we still cherish the Monroe Doctrine and regard it as an essential part of our international law. Russia's boundaries in Asia stretch for more than 4,000 miles along the frontiers of Asiatic states, and she is vitally affected by the conditions, by the disturbances and disorders existing in those states. In comparison, no other European nation is affected by them. By what might be called a Russian Monroe Doctrine, which would be as justifiable and as logical as our own, Russia might claim to be the sole guardian, and, in necessity, the sole arbiter of her Asiatic neighbors. Siberia and the Trans-Siberian Railway are in time to render such procedure a fact. Russia, not so much pursuing a definite Eastern policy as fitting in to the exigencies of her Eastern situation, has acted and still acts in the old hemisphere exactly as the United States have acted and still act in the new. She has simply conformed to the law of her being and to the logic of events. The "rectification of frontiers" to the advantage of the more powerful has been the course which the greater states without exception have followed from the beginning and will probably follow to the end of time. The continuous history of the United States and of Great Britain in particular debar those nations from drawing up indictment against Russian aggression in Manchuria or anywhere else. Maladministered by the Chinese as far as it has been administered at all, never an integral part of China proper, the already virtually accomplished absorption of Manchuria by Russia furthers the welfare and prosperity of that province and of the Eastern world.

RUSSIA AND THE EAST

The recent troubles in China present only an acute but temporary phase of the

greater Eastern question. The smaller Eastern question centers upon the Bosphorus, and is that wherein Constantinople and the Ottoman Empire are involved. Formerly it seemed to cover all the political sky. It is overshadowed today by the problem of surpassing magnitude still farther east. The factors in the greater Eastern question are various and many; yet there is one factor that dwarfs them all. It is Russia in her expanding, vivifying march across Siberia. With her, as with no other nation, goes what to the Oriental counts more even than armies, and that is prestige. Her only possible Asiatic antagonist is Japan; but the nature which thousands of years have inwrought cannot be radically changed by the signature of a parchment or by an act of the will. The Oriental kisses not the hand he loves the dearest, but the hand he fears the most. Despite the newly assumed garments of western civilization, the Japanese are Oriental to the core. The only European nation which can at all vie with Russia is Great Britain; but in such possible contest Russia would strike from near at hand and Great Britain from far away. Moreover, not only have Great Britain's hands been tied and her resources strained, but her military renown has, as the Oriental judges, been shattered in the South African war. Divergent interests and mutual jealousies prevent a combination of European powers under her leadership against Russia, such as she was able to accomplish against France in the Napoleonic wars. From the background of Siberia one figure stands forth distinct—the triumphant Slav!

GERMAN GEOGRAPHERS AND GERMAN GEOGRAPHY

BY MARTHA KRUG GENTHE, PH. D., ANN ARBOR, MICHIGAN

OF the countries that have taken an active part in the development of geographic knowledge Germany has always ranked among the foremost. The love of travel, of strange adventure, of tales true and tales false which touch the imagination, is innate in the Teutonic race. It made the northern Vikings discoverers of America long before Columbus; it unveiled to them the inhospitable coasts of Greenland and Iceland; it gave rise to the first known North Polar expedition—the expedition *in ultimam septentrionis axem* of 1140 A. D., of which Adam von Bremen has left us an account. Indeed, we may trace it down even to the recent travels of the heroes of discovery of the last century; for, unlike the explorers of most other nations, the German travelers were uninfluenced by political or economic motives. It is only within the last twenty years that Germany has begun to found colonies; yet it has not been the absence of the colonial spirit or blindness to the advantages of colonization which kept her in the rear. We know that when the New World was discovered German merchants, the Fuggers of Augsburg, then the chiefs of the East Indian commerce, were quick to grasp the possibilities of the situation, and founded branch establishments of their houses in Lisbon, and in the coffee and cocoa districts of South America; but the sad political conditions of the empire at that time put an early end to these aspirations, just as it did to the attempts

of the Great Elector one hundred years later to found colonies on the coast of Guinea ; and so the era which laid the foundation of the naval and commercial power of all the states of western Europe proved to be the ruin of that of Germany, since the lines of trade which had enriched it were now forsaken and the new ones were for her unattainable.

But so strong was the vitality of the geographical spirit in Germany that even those sad times could not quite overcome it. If the nation could not help being cut off from the actual progress of discovery, it could partake in it mentally. The eyes of German observers followed the navigators and explorers to the unknown lands across the sea ; they listened to the reports that came from there, and wrote them down and printed and propagated them, and it seems that through all the epoch of the discoveries books of voyage and travel were in no country read more eagerly than in Germany. Peddlers sold thousands of pamphlets dealing with true and false stories of the fabulous countries of the West, and German *Landsknechte* left their homes and sold their services to the Spaniard and the Portuguese in order to get there. One of these men, Ulrich Schmiedel, wrote an account of his American experiences which to this day is one of the most interesting sources for facts relating to the state of South America at the times of the conquest.

DAWN OF MODERN GEOGRAPHY

With this elementary interest another and a higher interest went hand in hand. From the standpoint of natural curiosity which delights in the strange unknown, attention soon passed to the examination of the facts related, to the putting together and comparing of the different reports, to the distinguishing of what was true or false, important or unimportant, to the arranging and classifying of the results obtained. Undisturbed by material and dynastic interests which in the conquering countries directed attention toward certain parts of the world, to the neglect of the rest, this quiet progress found in Germany the best conditions for development, and thus, while the *conquistadores* enriched their countries with gold and silver, the German geographers found treasures of another kind in discovering, or rather rediscovering, the scientific conception of the earth's face, the application to the enlarged cosmographical horizon of the scientific geographic methods of antiquity. In one word, they found the spirit of modern scientific geography. It was in Germany that the first globes and charts of the world were made, that in consequence of this a thorough reform of map-drawing and projection took place, that the idea of the atlas was first conceived and realized, that the first modern descriptions of the world, and the first systematic handbooks of general and physical geography were printed.

BEHAIM

The Bavarian, Johannes Müller, known better as Regiomontanus (after his native city, Königsberg in Franconia), first thought of constructing an earth's globe toward the end of the fifteenth century ; the idea was carried out by one of his countrymen, Martin Behaim, of Nuremberg. Behaim, one of the few Germans who took an active part in the great discoveries, had accompanied Diego Caõ on his voyage to the west coast of Africa in 1484–'85, and after his return made the famous globe still preserved in the "Germanische Museum" at Nuremberg, which has brought down to our days the image of how the world was conceived in the scientific mind immediately before the discovery of America, for the globe was finished in 1492, a few months before the arrival of Columbus at the land

of promise. We see on it distinctly the consequences of those errors of Toscanelli's chart, which made the Genoese estimate the distance much shorter than it really was, and thus encouraged their daring enterprise.

MERCATOR

In the line of map-drawing, Behaim, Regiomontanus, and others undertook a revision of the methods of projection. Gerhard Kaufmann, better known as Mercator, invented a new method specially adapted to the wants of charts of the world, which is still in use and bears his name as the well-known Mercator projection. It was he, too, who after another German, Örtel, or Ortelius, had first united into a volume several maps belonging together, chose for such a collection the name of Atlas.

NAME AMERICA

I wonder whether all Americans are aware of the fact that even the name of their continent is due to none but a German scholar: In 1507 Martin Waldseemüller, also known as Hylacomylus, of St. Dié, in the Vosges, edited a book called *Cosmographiæ Introductio*, in which he gave a translation of Amerigo Vespucci's description of his voyages. That was just the time when Amerigo's fame filled the world, while Columbus' disgrace overshadowed his merit, and evidently his name had never reached the quiet village in the Vosges when Amerigo trumpeted forth his own glory. So Hylacomylus proposed that, since the new continent was, after all, not a part of the Indies, no name would suit it better than that of his famous explorer, Amerigo. The book was read far and wide, and so quickly was the proposition accepted that, when later on the true discoverer was known, the name was already rooted too deeply in general use to be abolished, and was even extended to the north part of the continent, while Hylacomylus had only meant it for Amerigo's special stage, the present South America.

EARLY GEOGRAPHIES

Another *Cosmographia* appeared in 1524, by Apianus (Bennewitz); the *Weltbuch* of Sebastian Frank, in 1534; in 1544 the fine *Cosmographia* of Sebastian Münster, and Merian's *Topographia* added to its descriptions the most beautiful engravings, which today still delight the eyes of the geographer as well as of the lover of art.

These works of descriptive character were followed by attempts at rational investigation. After Francis Bacon had first pointed to the relations of discovery and philosophy, philosophers had never quite lost sight of geography. The question of effects and causes thus came into it, the distinction of different kinds and classes of phenomena, and their division and subdivision into larger and smaller groups; the foundation of geographic systems, and with it the germ of the scientific study of geography. Cluverius' (Philipp Kluver, of Dantzic) *Introductiones in geographiam universam*, in 1629, was the first attempt in this line. In 1652 followed Varenius' (Bernhard Varen, of Hitzacker-on-the-Elbe) wonderful *Geographia Generalis*, in which we find the outlines of almost the whole domain of modern general geography, and in 1678 the learned Jesuit Athanasius Kircher published his *Mundus Subterraneus*, containing, among others, the first chart of the currents of the Atlantic Ocean, of a correctness which is marvelous considering the little knowledge of the time about ocean currents. Thus, though not materially connected with the great discoveries and conquests, Germany still held an honorable record among the fellow-nations, for hers was the intellectual and scientific conquest of the world which, when the others decayed and fell, remained as vigorous as before.

KANT

One of the most curious and admirable types of the learned German, who, though shut out from the world by forces stronger than he, yet with the eyes of the soul surveys and knows the whole world better than many others who have had all the advantages of voyage and travel, is Immanuel Kant, the philosopher of Königsberg. The work of this unique man in the development of geography, although through his whole life he never saw more than the environs of his native city, must never be forgotten. In his youth he was keenly interested in natural sciences, and through the reading of voyages and travels had acquired such a perfect knowledge of geography that during several semesters he gave lectures on physical geography and on anthropology, in addition to his philosophical lectures, and great was his renown also as an authority in nature problems. His most wonderful work in this line, however, equal to the *Critique of Pure Reason*, is the *Allgemeine Naturgeschichte und Theorie des Himmels* (General natural history and theory of the heavens), in which, forty years before Laplace, he exposed the formation of the earth and the solar system out of a rotating ball of gas, as it is now accepted. By a singular mischance the manuscript was lost at the printer's, and we know of it only through one of Kant's later works, in which he gives a sketch of this theory. Thus the great French mathematician could formulate the theory again and enjoy the glory of being the discoverer of the Nebular Hypothesis, which he well deserves, as he did not know Kant's book; but later times have rightly given this theory the name of the "Kant-Laplace Hypothesis."

HUMBOLDT

Like Kant, many of the leading German scientists of his time were attracted to geography. We may name here the brothers Forster—Georg, author of *Ansichten vom Niederrhein*, and Johann Reinhold, the companion of Cook on his voyages—Leopold von Buch, the geologist, whose *Voyage to Lappland* is one of the finest specimens of geographical literature, and, above all, the great naturalist, traveler, and geographer, Alexander von Humboldt, the scientific discoverer of the Equinoctial Regions of the New Continent. In a course of lectures which he gave in later years at Berlin and worked out afterward into one of his finest books, *Kosmos*, or Outlines of a Physical Description of the World, he delineated the subjects and ends of geography in a most remarkable way. To him the thought first presented itself that besides the different departments of the special natural sciences, there was need of a general one which might bring the isolated facts of the others together and trace out of them the general features of the globe, or, as he expresses it, "consider the results of scientific research in its vast relations to mankind," and "recognize in the struggles of the elements that which is produced by a certain order or law." By this he ought not to be understood as wanting in a philosopher's way to derive the science of the earth by abstract theories from some fundamental principles; not at all. His geography, namely, description of the earth, was "the thoughtful observation of the empirical phenomena," and he repeats over and over again that "without a serious inclination for the knowledge of details every large and generalizing conception of the world would be nothing but a deceitful mirage," but that "the details of natural discovery possess an innate force of mutual fertilization." Thus "the unity of a physical description of the world is no other but that which is found also in the study of history." Both geography and history stand on the same empirical foundation, but the

thoughtful observation of natural phenomena, as well as of historical facts, must necessarily lead to the recognition of an old inner law dominating under the perpetual changes of material and intellectual forces. The geography of plants or of animals is then as different from descriptive botany and zoölogy as the geological knowledge of the earth is from mineralogy. His physical description of the world is therefore "not to be confounded with a so-called cyclopedia of natural sciences." In it details are only studied in their relation to the whole, as parts of the world's phenomena, and the higher this point of view the more this doctrine will become capable of individual treatment and enlivening report.

RITTER

By the side of Humboldt we meet with another man who, after Kant had explained the genesis of the earth and Humboldt had defined the basis of the scientific examination of its physical conditions, took up the question of man's influence upon and relation to geographical problems: it was Karl Ritter, in his *Erdkunde im Verhältniss zur Natur und Geschichte des Menschen* (Geography in relation to the nature and history of man). We notice at once that a change in the meaning of the word geography has here taken place. Hitherto geography, according to the composition of the Greek root, had always been translated as "Erd- (or Welt-) beschreibung" (description of the earth or world), but it is now called "Erdkunde," a name which may be rendered only approximately by "knowledge of the earth." What Ritter wants to express by the choice of the name is that geography, whether physical or political, is not a descriptive discipline, as thus it would not deserve the name of a science, but a subject full of problems worthy of the most exact scientific and philosophic discrimination. It not only imposes on the student a multitude of facts to be remembered, but introduces him into the secret laws ruling the natural and political history of the world, the precise recognition of which, of their influence on the development of nature and of man, is the object of geographical studies, without regard to practical and commercial purposes. In the introduction to his *Allgemeine Erdkunde* Ritter says: "This geography (Erdkunde) is called general, not because it intends to give everything, but because it investigates with *equal* attention and *without consideration of any special ends* the characteristics of every part of the earth and every one of its forms, whether it lie in the ocean or on the land, on a far-away continent or in our own country, or be the seat of a cultivated nation or a desert." These words form a milestone in the development of modern geography. They express for the first time unmistakably the program of the so-called comparative geography, which would be sorely misunderstood if it was thought a method consisting principally of questions like those found in so many text-books, "Compare such and such city, river, boundary," which is only a more interesting way to better remember certain facts. Such exercises are only the rude framework of real comparative geography. We may say that all comparative geography includes a certain amount of comparison, but that any geographical comparison does not represent comparative geography.

The results of such elementary comparison are the very beginning of comparative geography. After having obtained them, the real comparative work only sets in with inquiring after the different causes which produce them and the different effects which they produce. Then only we shall be able to actually compare the character of different parts of the globe, and dare to say that we know them. Of what value is

it to know the different numbers which represent the population of two states without knowing to what they are due? You may reply, "The principal thing is to know the facts. The farmer and the merchant little care for causes, provided that they know where to find the largest number of customers." Such an answer would be that of a tradesman, not of a scientist. Moreover, even the business man might gain by studying the causes of the variations of the market. Now, if such advantage is gained by this method even for practical interests, must it not be of far greater consequence for pure science? For science does not confine itself to the wants of the day; it pays equal attention to all the various problems, and thus, of course, obtains far more general and more trustworthy results. It was this question that Ritter first took up most energetically. That which makes geography a science, and penetrates the work of Humboldt as it did that of Varenius, shines out with perfect precision, in the words of Ritter, "without consideration of any special ends."

PURPOSE OF GEOGRAPHY

He who studies or teaches geography merely to acquire such a knowledge of geographical facts as is needed for traveling, or for the reading of newspapers, or for business enterprise, resembles the jeweler who knows all the qualities of the precious stones in his store. He is as little a geographer as you would call such a jeweler a mineralogist; but as surely as there is a way of knowing stones which constitutes a science called mineralogy, is there a way of knowing rivers, mountains, and dwelling-places which deserves the name of scientific geography. It is the way in which the study is carried on that makes the difference. Geography has its value in itself, and must be studied through itself, and for the sake of itself, not for secondary purposes. If practical advantage is also gained out of it, so much the better; but it is not the leading purpose.

GERMAN ACTIVITY IN GEOGRAPHY

This is the Credo of German geography, as represented at twenty universities, many of which possess quite a staff of professors, ordinary and extraordinary, private docents, and assistants in geography, together with a complete geographical apparatus of books, periodicals, maps, globes, pictures, photographs, lantern-slides, and the so-called "Geographisches Seminar" or institute, where practical courses are also given. In a territory considerably less than that of Texas, Germany has more than twenty geographical societies, who do valuable work in local or general geography, and send out travelers by means of special funds. They publish scientific reports every year, and besides these a dozen geographic periodicals are published by divers editors, some of which are only equaled by the publications of the Royal Geographical Society of London. Geography is taught not only in primary schools, but in the "Gymnasium" and high schools for from five to seven years, and there is now an agitation to give it a still wider extent in these schools, and to have it taught from beginning to end by teachers specially trained in the subject at the university; for geography is in the university studies a subject in which one can obtain a Ph. D. degree after three or more years' study on the university plan, and by the presentation of a thesis on a geographical subject which contains positive results of original scientific research. This is the present state of the movement started by Karl Ritter and his school.

BERGHAUS

The pioneer of the new ideas was Heinrich Berghaus, Humboldt's friend,

who in his *Länder und Völkerkunde* gave the first text-book, or rather hand-book, composed after the new principles ; but more important than this is his Physical Atlas, which down to our times has held a fundamental and leading position in physical geography, and only recently has been imitated in an enlarged size by the great physical atlas which is now being published in London. After Berghaus, Oscar Peschel became the head and the soul of geographic progress. During more than twenty-five years he edited one of the best geographic periodicals, the *Ausland*, and his books on Physical Geography, New Problems of Comparative Geography, Ethnology, History of Geography, History of the Age of the Discoveries, though partly supplanted by more recent publications, belong to this class of scientific literature.

RICHTHOFEN

A new epoch was opened by Ferdinand von Richthofen, the explorer of China and Peschel's successor in the chair of geography at the University of Leipzig. The address which he gave at his inauguration in 1883, *Uber Aufgaben und Methoden der heutigen Geographie* (On the problems and methods of modern geography), became the program of modern geographers, and was indeed the first critical and systematic survey of the whole domain of geography. The program has been changed since in details, as all science undergoes constant change and evolution, but it rests to this day upon the foundation he presented.

In this treatise Richthofen first defines the limits of geography, giving as its special field of research the surface of the earth. Various are the phenomena which it offers, and which have been studied by various sciences; but geographical work begins with the problem of location of the different phenomena, with the question, Where? The surface of the earth may be conceived in a double way : as a mathematical or a material surface. In the former meaning the geographer's work consists in measuring the earth's extent, which will lead him to define and to represent the relief on maps, and to subordinate the different results of his work to inherent laws, which will build up the morphological side of geography. Then this surface is also subject to cosmological influences; their investigation will need the assistance of astronomy and mathematics, and is called astronomical or mathematical geography. The material surface is composed of different substances, classed in three grand divisions — atmosphere, hydrosphere, and lithosphere—each of which consists of various components in various proportions at various times; geography must find out the local relations of the multiple problems and phenomena arising from these combinations. To this end it needs the assistance of meteorology, hydrology, and geology, without being itself one of these sciences, since it cares for them only for the sake of the consequences which their phenomena produce in the configuration of the surface. This is physical geography.

But the earth's surface is not a rigid one. It is constantly undergoing changes which arise from the different forms of life existing on it, and this obliges the geographer to also take the forms of life in consideration. For this he needs the assistance of botany and zoölogy, which again furnish him their facts in order that he may study in them the influence of location, of height, latitude, continental and marine surroundings, etc. These branches of geography are zoögraphy and phytogeography.

At last we must consider the influence of man on all the preceding phenomena, and their influence on him. For this purpose the geographer must consult history, statistics, sociology, ethnology, and anthropology. Out of these investi-

gations he establishes the last great subdivision—anthropogeography.

It is impossible in this short review to enter into more than the outlines of this vast program; but even these show that we have to deal here with the foundation of all geographic work of the last fifteen years. From this time we must reckon the wonderful development of recent geographic investigation in Germany, represented not only by the name of Richthofen, but by the names of Penck, Suess, Richter, Brückner, Supan, Günther, Gerland, Drygalsky, Hettner, Phillipson, and others.

It was natural that, Richthofen himself having entered the field of geography from the geologic side, those branches of geography which are most closely connected with geology should have been most cultivated by him and his followers. Thus it happened that those geographic questions which are related to natural science received most of the advantage of the new impulse, namely, the problems of physical geography. It even seemed for some time as if the idea of scientific geography would be only applied to this division, as if geography was nothing but a subdivision of natural science. This opinion was even held by a party of the geographers themselves; but now, with the exception of a very small minority, of which Professor Gerland, at Strassburg, is the most important representative, it may be looked upon as a past epoch in geographic evolution. Valuable as the study of physical geography is, it cannot be denied that it is only a part of geography, not geography itself, and that the topic most alive in public interest, the question of human life, work, and influence upon the earth's surface, the so-called political geography, is just as indispensable. The study of physical geography alone would deal with the earth as a dead planet, a planet without life or history.

This disproportion between the progress of physical and the backwardness of political geography was naturally felt most sorely in schools, which would make the former a very interesting branch of teaching, while there was no way of learning the latter except by learning single facts by heart, since the knowledge of these facts was indispensable after all. For "no physical or geological wisdom," said then Professor Kirchhoff, of Halle, one of the foremost men in the progress of school methods, "will help him who does not know whether Madrid lies in Spain and Petersburg in Russia, or vice versa." Thus necessity led geographers back quite naturally from the overemphasis of physical geography to the further pursuit of Ritter's ways. It was recognized that such an important branch of instruction must needs have a scientific foundation, and that if this foundation had not yet been discovered, the reason might be that the right point of view had not yet been taken.

RATZEL

This point of view was found and Ritter's method taken up again with the improvements of modern science by Friedrich Ratzel, Richthofen's successor in the Leipzig chair of geography. We are reminded of Humboldt's remarks on the spirit of physical geography when we read Ratzel's words: "The complaints of the dryness of political geography, as old as geographic instruction itself, are heard again and again in our times. They seem to be the result of lack in pedagogic skill; but the fault lies deeper, it lies in the scientific treatment of political geography. For this is the cause of all the difficulties in this branch of instruction, that the facts of political geography still lie much too rigidly beside each other and beside those of physical geography. The instruction in this important branch will never be rendered interesting unless the

material is cleared up by classification and refined by investigations, paying special attention to comparison and evolution." (Preface to the *Political Geography*.)

The first attempt in this direction was the *Anthropogeography* (Munich, 1882), or *Outlines of the Application of Geography to History*. Although the book was not spared opposition from the first, it started a new epoch in geographic research, and after various special works on the same subject, a second volume followed several years later. In 1896 a treatise, *Der Staat und sein Boden*, published in the Proceedings of the Royal Saxon Academy of Sciences, gave the problem a still closer connection with political questions, and in 1897 the author published a new standard work, containing the application of the scientific method to the very political geography which had so long been only a list of names and numbers, the *Politische Geographie*. The word political in this title stands for more than a mere nomination; the aim of the book is to define the close connection of politics and geography in a manner which makes it valuable equally for the statesman and for the geographer. The author hopes it may give the former a better understanding of geographical, the latter of political, influences in his sphere of interest, and thus awake, not only in teachers, but in all his readers, of whatever condition, what he calls "geographischen Sinn," geographical feeling, just as we speak of acquiring the feeling for a language in philological studies. To him, states are organisms in various stages of development, and they are made geographic organisms by being most closely bound to the soil on which they develop, penetrating deeper and deeper into its resources. As such geographic phenomena they can be observed, described, measured, drawn, compared like every other phenomenon of life on the earth. The mistake of former political and sociological theories was that they dealt with a too theoretical conception of the state—a state, as it were, which stands in the air, and which owns the soil as a kind of large property. But we must put that airy state on the solid foundation of the earth, and then we shall get a living conception of the political side of geography. According to this programme, the author deals in nine chapters with the following topics: The State and its Soil; the Historical Movement and the Growth of States; Fundamental Laws of the Increase of the Area of the State; Situation; Area; Boundaries; Land and Sea; the World of the Water; Mountains and Plains. He presented one year later the application of his principles in the little book entitled *Deutschland*, which every one who wishes to obtain an idea of modern German geography should read.

WHAT IS GEOGRAPHY?

Geography, then, as carried on in Germany, is a field of manifold studies. It requires the knowledge of mathematical and physical geography, including map-drawing and surveying, oceanography, climatology, geography of plants and animals, anthropogeography, political, and commercial geography, history of geography, together with a general acquaintance with the cognate sciences, such as geology, physics, ethnology, history, political economy, and philosophy, and also, if possible, with botany, zoölogy, and anthropology; but even this would not yet make a geographer. We must remember Humboldt's words, that geography is not "a so-called cyclopedia of natural sciences," and that from the knowledge which the sciences impart we must always proceed to the consideration of the whole. The whole, as shown in Ratzel's *Deutschland* and a number of similar publications, consists in the application of this general knowl-

edge to a certain region of the surface of the earth, the so-called "Länderkunde" of German geography, which is no longer a mere description of the different countries, but a scientific investigation of their characteristics. It is quite significant that no other language has an exact synonym of this denomination, a fact which more than anything else shows that it is a German specialty of entirely German origin. The "Länderkunde," so often called very inadequately "descriptive geography," is represented at German universities, as well as general and systematic geography. Every professor will, beside these courses, devote a large part of his time to a single country or continent, which always is the most interesting part of the whole study.

ELEMENTARY TEACHING

In school geography "Länderkunde" is of course the dominant subject, to which all general geography has only a subordinate and tributary relation; for to children's eyes we must never present the dry and, to them, sterile facts of systematic knowledge. It is applied science which fits a child's understanding and rouses his interest. If we want children to pay attention to effects and causes we must let them see things and incidents in which they operate, give them a picture of concrete life, not abstract reflection. Now, in order to thus embody the principles of geography, no better means can be found than "Länderkunde." A course in geography that opens with a definition of geography and of the primary notions of the geographic vocabulary, and which gives an introductory course on the principal subjects of general physical geography before taking up the study of a definite part of the earth, would not only be very unpsychological, but do also the greatest harm to geography itself. For to the young learner who has to put such generalizations into his brains without enough knowledge of details to make him feel their general truth geography will appear nothing but a complexity of phrases to be learned by heart, and this preconception will cause him to look at all the following geographic data from a wrong position; all the special facts will be received by him only as illustrations of the preceding principles, just as formerly in the teaching of languages the spoken language appeared only as a collection of examples to apply grammatical rules; but this was putting the cart before the horse. This same mistake has often made geography a very dull subject, while it can be one of the most interesting, even for young minds. The secret of a successful teacher of geography, as of languages, is to give the pupil a whole and living unit, of which his imagination may get hold, and to present the unit so that he will feel the leading principles before he has learned them separately. Thus their necessity impresses itself upon his mind spontaneously, instead of being demonstrated to him as a scientific Credo.

In such a course it is then not permitted to treat a continent or a state or another district first physically and afterward, perhaps a year later, politically, or even, as I have seen in textbooks, first politically and then physically, or to treat the subject by classifying the details under special headings, as relief, watershed, productions, dwelling-places, etc., through which the causal connections are inevitably torn asunder. Instead of this the teacher will, after a short general survey of the whole, divide it up into a number of smaller units or natural regions, within which he will treat the different topics and their mutual influences upon each other. He will make, as it were, a horizontal section through the vertical columns of the topics named above, and work out the picture given by each of these sections as an individual subject and in its rela-

tions to its neighbors. After this a short historical sketch, with sufficient reference to the geographic conditions of the historical development, will furnish the basis for an examination of the political contours of the map, in which much repetition of the preceding lessons will come in. Reciting the geographic facts according to special topics may be used as a means of repetition, as a help to the pure memory of names, but even then must never be done without always pointing out on the map the location of the places mentioned. It is, however, absolutely to be condemned as a part of the lesson, because it kills the geographic feeling.

The first country studied in this way is, of course, the native country, especially the home of the child and its environs. This home geography fills the first year and gives opportunity to make the child acquainted with the preliminaries of general geography, not in a systematic, but in an inductive way, and to introduce it to the thoughtful use of the map. Map-reading may be carried on to a very high degree of perfection, and even furnish positive knowledge of phenomena which cannot be studied in nature, if map-drawing for school purposes is done with such perfection as in Germany, where the principle that for children the best things are just good enough has exercised a wonderful influence also in this direction. The cartographic productions of Debes (Leipzig), Perthes (Gotha), and Reimer (Berlin) have no peer in any country. In a German geography class, therefore, you can observe that the teacher really gets his pupils to read the cartographic representations like letters in a book, to use the map as a directory in walking, to find their way easily in unknown places by the aid of the map, and perhaps we have here one of the reasons why Germany more than any other country is the home of pedestrian trips and of travelers' guide-books.

In the second year follows the study of Germany, after this a general survey of the globe and continents, then the special study of Europe and of the foreign continents. It is not until then that the systematic teaching of general physical geography begins, which is now indeed nothing but the repeating, putting together, completing, and systematizing of what the pupils have already learned in the former grades in an occasional and inductive way. Part of the schools make this the final course; others take after it a second and more advanced course of the geography of Germany, with special attention to political, social, economic, commercial, and colonial problems, for which mature pupils are better fitted than the children of the first German course. Thus on leaving school they have a clear idea of the actual state and conditions of the country in whose life they are to participate. On the whole, the average German who does not pursue higher studies will have from seven to nine years of geography, with generally two hours a week for 40 weeks each year. This makes about 550 to 700 lessons in the whole course, or 17 per cent of all the instruction imparted outside the university.

WHY STUDY GEOGRAPHY?

It seems proper to ask why German educators lay so much stress on geographic training. What is the value of a thorough study of geography for education and for life?

There are, of course, a number of practical reasons. The knowledge of many geographic facts is so necessary for everybody that even when no higher merit had yet been found in it, the study of geography was included at least in the schedule of primary schools.

As to scientific geography, the question has often seemed not very easy to answer. It has been objected that if

geography comprised all the various branches named above, it could hardly be called a science, but was rather an agglomeration of fragmentary knowledge borrowed from a dozen other sciences, the study of which was an impossibility even for a first-rate intelligence, and must needs lead to a kind of half knowledge of everything which was the very contrary of scientific work. It has been one of the most serious tasks of geographers to refute this objection which has been repeated most obstinately over and over again, as it arises from an entire misunderstanding of the geographical spirit. In the first place, there is no science now known in which one mind can have an equally complete command of all the subdivisions; even the greatest men in medicine, zoölogy, history, etc., are specialists in some definitely limited area, while they merely keep up with the scientific progress of the rest and leave other specialists to do other special work. Yet nobody will accuse them of superficiality. Why should not the geographer enjoy the same privilege? But even if it were possible for one man to have a perfect and up-to-date knowledge of all knowledge connected with geography, that would not make him a geographer. Geography is not a "cyclopedia" of all the enumerated sciences. That is the point where erroneous judgments on geography generally start. It is not the number and character of the facts which constitute geography, but the ways and methods in which they are studied. This is what makes the geographic spirit and what gives geography the character of a separate science apart from all the others, however closely connected with them in many points.

Thus, for example, the physicist may study, describe, and explain the deviation of the compass or the differences of temperature of the atmosphere; but the geographer (Humboldt) will locate on the map the points of observations and connect equal observations by lines, and from the arrangement of these lines draw conclusions as to the influence of magnetism or temperature upon the surface of the earth; or the statesman will draw and claim boundaries for the state which he represents for such and such reasons; the geographer will look at and compare the boundaries of the states in different parts of the world, find out the laws active in their formation, tell us why certain boundaries have always been objects of contention while others never were disputed, and explain the present boundaries, their origin, and their importance for the life of the nations (Ratzel); or the geologist will study and explain the different strata of the earth's crust; the geographer (Brückner) will examine their distribution over the surface of the globe, compare it with the present arrangement of mountain ranges, and explain out of the geologic past the features of the geographic present. In whatever problem the geographer may be interested, the object of his investigation must be connected with the earth, the earth's surface as a whole and as the primary unit. However interesting may be the object of his special research, he cannot allow himself to be entirely confined to it without ceasing to be a geographer.

POINT OF VIEW

The poet Jean Paul says: "There are two ways of enjoying the world. One is to lie down in the grass, look at the green stalks and pretty flowers about you, watch the humming insects, and thus fondly take in all the wonderful revelations of life which present themselves in this seclusion. The other is to rise up high in the air like a bird, so high that all the little and mean things vanish from your view, and you only behold the whole of the great, wonderful creation beneath you."

In geography both methods are combined. By the peculiar character of its

procedure, which requires a scrupulous examination of the detail, together with a wide survey of generality, it exchanges constantly the small circle of special research and the wide field of generalization. Must not such a change between restriction and expansion be most helpful? It is a fact that the type of the learned specialist who is almost a stranger to the problems beyond the limits of his own work is in no field so rare, if not so totally absent, as in geography. The broadest-minded people of the fine staff of German scientists, the most alive to the interests of the world about them, are met with among the professors of geography. Geography forces its apostles to keep constantly apace with all the progress around them. In no other field of study would the neglect of almost any question of the day, scientific or not, prove more fatal than here. The introduction of the study of geography into the universities, therefore, is a powerful ally to keep the students from becoming narrow in their views, from looking no further than the small circle within which the axis of their own special interests rotates. It will make them tolerant by teaching them to understand different conditions, and to make allowance for different consequences arising from these different conditions. It will make them wise and successful in contact with political questions, because they will not expect nor exact from foreign nations more than they can afford, according to their actual state and circumstances.

UTILITY OF GEOGRAPHY

Geography, more than almost any other science, has the power to enrich the lives of those who devote themselves to its study. The botanist may teach you the secrets of the life of trees and plants, the zoölogist introduce you into the interesting ways and habits of many a little fellow-creature, the geologist open your eyes for the charms of tracing the history of the soil which you tread, but none gives you such an entire and satisfactory feeling of nature as geography. It is the entirety of the impression upon which stress ought to be laid. The natural disposition of the average mind goes to the whole. Even a good botanist or other scientist will be specially interested only in part of what surrounds him, be it plants or animals or stones, sometimes even only in a certain class or family of them. Geography teaches you to enjoy nature as a whole. It tells you why the soft lines of this mountain range, covered with dark firs, slope so gently down to the valley, while yonder ice-capped summits tower up steep and bold to the sky. It shows you why here waving cornfields reward the farmer's labor, and why another region seems to be one enormous meadow.

Geography will contribute, too, to improve the character and adorn the life of the student. It will make him feel familiar and at home on almost every spot of the earth; nowhere will he stand criticising and complaining of what is different from his native place, but appreciate the differences of nationality, and instead of repining for what cannot be changed, come home enriched by the touch of many a string in his heart which would never have resounded under other circumstances. In the character of the German nation we see this side highly developed, too highly even from certain points of view. The readiness with which the German adopts foreign customs when he goes abroad, as well as when they are brought to him, the facility with which as an immigrant he accommodates himself to the conditions of his new home is in great measure due to his highly developed feeling of geographic equity. A reasonable portion of it added to national character would be an improvement for many races.

Political geography, especially, must

not be forgotten when we deal with the advantages of geography. Much information of high value is offered through it to the student. Economic and social problems, questions of government and constitution, which when treated in an abstract and theoretical way will often fall short of the understanding, as well as of the interest of young brains, find here wonderful material for exemplification, object-lessons in public life, politics, economy, and sociology. Enormous treasures lie hidden here, waiting only for the right digger to discover them. In a country where interest in public affairs is so strong as in this great Republic, this duty of the schools should be cherished most conscientiously. Geography should be given the place which it deserves, not only in elementary instruction, but also in all high schools and universities.

THE DRIFT OF FLOATING BOTTLES IN THE PACIFIC OCEAN

By James Page, U. S. Hydrographic Office

AMONG the various investigations carried on by the U. S. Hydrographic Office, there is one which has always excited greater or less popular interest, owing probably to the fact that it lies within the power of any one who is at sea, and who is likewise gifted with a reasonable amount of curiosity and the leisure time to gratify it, to contribute toward the end in view. This particular field of research is the investigation of the surface currents of the sea by means of the knowledge obtained through the drift of floating bottles, or, as it is familiarly known, the drift of bottle papers. The apparatus required is not extensive. The date, the latitude, and the longitude of the vessel at any given time are written upon a piece of paper; this paper is then placed in an empty bottle of whatever character is nearest to hand; the bottle is then corked and sealed and cast into the sea. After the lapse of time, sometimes of years, certain of these bottles find their way to the coasts of the adjacent continents or islands, and the papers contained in them ultimately reach the U. S. Hydrographic Office.

The office assists in the investigation to the extent of furnishing the pieces of paper. These are prepared in blocks, and are distributed free of charge to the masters of vessels who promise to undertake the task of casting them adrift—a promise which, the results prove, is rarely violated. The paper is printed in seven languages in order that it may be readily understood, no matter upon what coast it ultimately lands. The first part, which is to be filled in by the person who casts it adrift, contains a space for the name of that person, for the name of the vessel, the date, the latitude, and the longitude; the second part, which is to be filled in by the discoverer of the bottle, a space for the name of the finder, the date, and the locality in which it is found. At the bottom of the paper the finder is instructed, in seven languages, to return the paper to the U. S. Hydrographic Office.

Several hundred of these papers find their way back each year, the great majority of those which are returned having been cast adrift in the Atlantic Ocean, and charts have from year to year appeared showing the drift of bot-

tles in that ocean. These charts all unite in showing a steady easterly drift in the temperate latitudes of both the North and the South Atlantic, and an equally steady westerly drift in the tropical latitudes, the generalized current system of either ocean thus consisting of a vast eddy about some central point, the direction of the circulation being anti-cyclonic in either hemisphere—*i. e.*, with the diurnal motion of the sun, as observed in that hemisphere, just as in the case of the prevailing winds.

Taken collectively, the lines of drift of floating bottles in the Pacific again show, precisely as in the case of the Atlantic Ocean, that the general direction of the drift is eastward in the higher latitudes, westward in the lower. At least this is so for the North Pacific. For the South Pacific evidence of the eastward motion of the extratropical waters is lacking. None of the drifts reveal the existence of the equatorial counter-current flowing eastward between the westward-moving equatorial currents of the southern and northern hemispheres. The average velocity of the easterly drifts is 4.4 miles per day, of the westerly drift 10 miles per day, or more than twice as great, which is again in accordance with the results for the Atlantic Ocean. The highest velocity attained was that of a bottle thrown overboard from the steamer *Warrimoo* January 23, 1897, in latitude 4° N., 168° W., and found March 6, 1897, on one of the Gilbert Islands, having drifted 1,100 miles in 42 days, or at an average rate of 26 miles per day. None of these velocities makes any allowance for the time during which the bottle may have lain undiscovered on the beach. The longest drift was that of a bottle which was thrown overboard near Cape Horn June 18, 1896, and found near Cape York, on the northern coast of Queensland, Australia, after the lapse of nearly three years. The shortest practicable route which it could have pursued measures 10,100 miles in length, or nearly two-thirds of the total distance around the earth in the latitude of its path, giving an average velocity of 10.1 miles per day. The actual distance traversed was probably much greater than this.

My main object in directing attention to these drifts is to suggest the idea that they illustrate an apparent paradox. The bottles themselves float upon the surface, but if I were asked whether the lines drawn upon a chart to show their course represented the surface currents of the sea, the currents with which the navigator has to deal, I should say *emphatically no.* The actual surface currents present no such uniformity, either in direction or velocity. As an example of this, take the currents actually observed in the five-degree square of the North Atlantic Ocean bounded by the parallels 35 to 40 degrees north and the meridians 65 to 70 degrees west (off the coast from Hatteras to Sandy Hook), in the heart, therefore, of what is ordinarily known as the Gulf Stream, concerning which the popular impression is that it flows along steadily like a mighty river. For any given month, say September, the currents actually observed within this square were as follows:

Setting northeast, 32 per cent of the whole number of observations ranging from 6 to 70 miles in 24 hours.

Setting southeast, 23 per cent of the whole number of observations ranging from 8 to 65 miles in 24 hours.

Setting southwest, 27 per cent of the whole number of observations ranging from 6 to 76 miles in 24 hours.

Setting northwest, 18 per cent of the whole number of observations ranging from 9 to 63 miles in 24 hours.

Evidently here there is none of the uniformity presented by the drifts and which the mind ordinarily associates with the Gulf Stream.

To get at the true meaning of these lines of drift beyond the fact that they represent the resultant of the traverse

line pursued by the bottle in its journey, it is necessary to go back to the motive power which gives rise to the surface currents of the sea, viz., the winds. A perfectly steady wind acting continuously on the surface of the sea will, through friction, give rise to a movement of the surface waters in the same direction as the wind itself. If the latter continues for a sufficient length of time the impulse, first felt only at the surface, will gradually communicate itself downward, owing to the viscosity of the water, and the lower strata to a successively greater and greater depth will thus partake of the movement until it is finally shared by the whole mass, the velocity of the motion diminishing as the depth increases. The rate, however, at which this motion is communicated to the depths of the ocean is exceedingly slow. It has, for instance, been estimated that in a depth of 2,000 fathoms a surface current of given velocity would require a period of 200,000 years to transmit its due proportion of this velocity to a point halfway toward the bottom. Similarly, when once established, these submarine currents exhibit a corresponding reluctance to undergo any variation in direction or intensity.*

Perfectly steady winds, however, do not exist, even in the region of the trades. The winds are constantly changing, and the surface currents change with them. The lower strata of the ocean, however, are insensible to these changes, and at a considerable distance below the surface the waters of the ocean have probably a slow but perfectly uniform motion, the direction of the motion probably agreeing closely with that of the resultant surface winds.

We have, therefore, in the body of the sea two distinct sets of currents; first, those at the immediate surface, which move practically at the obedience of the surface winds, sometimes in one direction, sometimes in another: second, those of the lower strata, which are constant in direction and velocity and represent the aggregate effect of the winds that have blown for ages past, the sea in this respect furnishing a close analogy to the atmosphere, the motion of the lower strata of which is constantly disturbed, while that of the higher strata, as shown by the motion of the cirrus clouds, is comparatively uniform.

It is the motion of these lower strata, as I take it, that the uniform paths pursued by these drifting bottles to some extent represent, and it is the evidence contained in them that should be studied in investigations dealing with the currents of the ocean in their entirety, rather than the evidence obtained from any given set of current measurements made at or near the surface and for some given point.

* Zöpprits, Annalen d. Hydrographie, 1878.

THE BRITISH ANTARCTIC EXPEDITION

THE *Discovery*, carrying the British National Antarctic expedition, is now well on her way to South Polar regions. The proposed work of the party has been carefully outlined by the presidents of the Royal Society and of the Royal Geographical Society in their instructions to Captain Scott and to Dr. George Murray, the scientific director. The instructions to the commander are as follows:

1. The Royal Society and the Royal Geographical Society, with the assistance of His Majesty's Government, have fitted out an expedition for scientific discovery and exploration in the Antarctic

regions, and have entrusted you with the command.

2. The objects of the expedition are: (*a*) to determine, as far as possible, the nature, condition, and extent of that portion of the South Polar lands which is included in the scope of your expedition, and (*b*) to make a magnetic survey in the southern regions to the south of the 40th parallel, and to carry on meteorological, oceanographic, geological, biological, and physical investigations and researches. Neither of these objects is to be sacrificed to the other.

3. The scientific work of the executive officers of the ship will be under your immediate control, and will include magnetic and meteorological observations, astronomical observations, surveying and charting, and sounding operations.

4. Associated with you, but under your command, there will be a civilian scientific staff, with a director at their head. A copy of his instructions accompanies these instructions to you.

5. In all questions connected with the scientific conduct of the expedition you will, as a matter of course, consider the director as your colleague, and on all these matters you will observe such consideration in respect to his wishes and suggestions as may be consistent with a due regard to the instructions under which you are acting, to the safe navigation of the ship, and to the comfort, health, discipline, and efficiency of all under your command. Those friendly relations and unreserved communications should be maintained between you which will tend so materially to the success of an expedition from which so many important results are looked for.

6. As the scientific objects of the expedition are manifold, some of them will come under the immediate supervision of the director and his staff; others will depend for their success on the joint coöperation of the naval and civil elements, while some will demand the undivided attention of yourself and your officers. Upon the harmonious working and hearty coöperation of all must depend the result of the expedition as a whole.

7. The expedition will be supplied with a complete set of magnetic instruments, both for observations at sea and on shore. Instructions for their use have been drawn up by Captain Creak, R. N., and yourself and three of your officers have gone through a course of instruction at Deptford with Captain Creak and at Kew Observatory. The magnetic observatory on board the *Discovery* has been carefully constructed with a view to securing it from any proximity to steel or iron, and this has involved considerable expense and some sacrifice in other respects. We therefore impress upon you that the greatest importance is attached to the series of magnetic observations to be taken under your superintendence, and we desire that you will spare no pains to ensure their accuracy and continuity. The base station for your magnetic work will be at Melbourne or at Christchurch, in New Zealand. A secondary base station is to be established by you, if possible, in Victoria Land. You should endeavor to carry the magnetic survey from the Cape to your primary base station, south of the 40th parallel, and from the same station across the Pacific to the meridian of Greenwich. It is also desired that you should observe along the tracks of Ross, in order to ascertain the magnetic changes that have taken place in the interval between the two voyages.

8. Geographical discovery and scientific exploration by sea and land should be conducted in two quadrants of the four into which the Antarctic regions are divided for convenience of reference, namely, the Victoria and Ross quadrants. It is desired that the extent of land should be ascertained by following the coast lines, that the depth and nature of the ice cap should be investigated, as well as the nature of the vol-

canic region, of the mountain ranges, and especially of any fossiliferous rocks.

9. A German expedition will start at the same time as the *Discovery*, and it is hoped that there will be cordial coöperation between the two expeditions as regards magnetic and meteorological observations, and in all other matters if opportunities offer for such coöperation. It is understood that the German expedition will establish an observatory on Kerguelen Island, and will then proceed to explore the Enderby quadrant, probably shaping a course south between the 70° E. and 80° E. meridians, with the object of wintering on the western side of Victoria Land, whence exploring sledge parties will be sent inland. The government of the Argentine Republic has undertaken to establish a magnetic observatory on Staten Island.

10. You will see that the meteorological observations are regularly taken every two hours, and, also, in accordance with a suggestion from the Berlin committee, every day at Greenwich noon. It is very desirable that there should, if possible, be a series of meteorological observations to the south of the 74th parallel.

11. As regards magnetic work and meteorological observations generally, you will follow the program arranged between the German and British committees, with the terms of which you are acquainted.

12. Whenever it is possible, while at sea, deep-sea sounding should be taken with serial temperatures, and samples of sea water at various depths are to be obtained for physical and chemical analysis. Dredging operations are to be carried on as frequently as possible, and all opportunities are to be taken for making biological and geological collections.

13. Instructions will be supplied for the various scientific observations; and the officers of the expedition will be furnished with a manual, prepared and edited by Dr. George Murray, on similar lines and with the same objects as the scientific manuals supplied to the Arctic expedition of 1875.

14. On leaving this country you are to proceed to Melbourne, or Lyttelton (Christchurch), New Zealand, touching at any port or ports on the way that you may consider it necessary or desirable to visit for supplies or repairs. Before leaving your base station you will fill up with live stock, coal, and other necessaries, and you will leave the port with three years' provisions on board, and fully supplied for wintering and for sledge-traveling.

15. You are to proceed at once to the edge of the pack and to force your vessel through it to the open water to the south. The pack is supposed to be closer in December than it has been found to be later in the season. But this is believed to depend rather on its position than on the time, and the great difference between a steamer and a sailing vessel perhaps makes up for any difference in the condition of the pack.

16. On reaching the south water you are at liberty to devote to exploration the earlier portion of the navigable season; but such exploration should, if possible, include an examination of the coast from Cape Johnson to Cape Crozier, with a view to finding a safe and suitable place for the operations of landing in the event of your deciding that the ship shall not winter in the ice.

The chief points of geographical interest are as follows: To explore the Ice Barrier of Sir James Ross to its eastern extremity, to discover the land which was believed by Ross to flank the barrier to the eastward or to ascertain that it does not exist, and generally to endeavor to solve the very important physical and geographical questions connected with this remarkable ice formation.

17. Owing to our very imperfect knowledge of the conditions which prevail in the Antarctic seas, we cannot

pronounce definitely whether it will be necessary for the ship to make her way out of the ice before the winter sets in or whether she should winter in the Antarctic regions. It is for you to decide on this important question after a careful examination of the local conditions.

18. If you should decide that the ship shall winter in the ice, the following instructions are to be observed :

a. Your efforts, as regards geographical exploration, should be directed, with the help of depots, to three objects, namely, an advance into the western mountains, an advance to the south, and the exploration of the volcanic region.

b. The director and his staff shall be allowed all facilities for the prosecution of their researches.

c. In carrying out *a* and *b* due regard is to be had to the safety and requirements of the expedition as a whole.

d. You have been provided by Sir Leopold McClintock and by Dr. Nansen with complete details respecting sledge-work both by men and dogs, and you have yourself superintended every item of the preparations connected with food, clothing, and equipment. You will be guided by the information and knowledge thus acquired.

e. Lieutenant Armitage, R. N. R., who has been appointed second in command and navigator to the expedition, has had experience in the work of taking astronomical, magnetic, and meteorological observations during three Polar winters. He has also acquired experience in sledge-traveling and in the driving and management of dogs. You will, no doubt, find his knowledge and experience of great use.

f. Early in 1903 your ship should be free from the ice of the winter quarters, and you will devote to further exploration by sea so much of the navigable season as will certainly leave time for the ship to return to the north of the pack ice. Having recruited at your base station, you will then proceed with your magnetic survey across the Pacific and return to this country.

19. If, on the other hand, you should decide not to winter, you will bear in mind that it is most important to maintain scientific observations on land throughout the winter, and therefore if you are able, in consultation with the director, to find a suitable place for a landing party between Cape Johnson and Cape Crozier, and decide that such a party can be landed and left without undue risk, the following instructions will apply :

a. You will land a party under the command of such person as you may appoint. Such party shall include the director, the physicist, and one of the surgeons, and such other persons as you may consider desirable ; but no person is to be left without his consent in writing, which you will be careful to obtain and preserve.

b. You will give every practicable assistance in establishing on land this party, which you will supply with all available requisites, including a dwelling hut, an observer's hut, three years' provisions, stores, fuel, sledges, and dogs.

c. No landing party is to be established on any other part of the coast than that between Cape Johnson and Cape Crozier, as it is above all things essential that in case of accident the approximate position of the party should be known.

d. Before it is so late as to endanger the freedom of your ship, you will proceed north of the pack and carry out magnetic observations with sounding and dredging over as many degrees of longitude (and as far south) as possible, so long as the season and your coal permit, and then return to your base station, whence you will telegraph your arrival and await further instructions.

20. You are to do your best to let us have and to leave where you can state-

ments of your intentions with regard to the places where you will deposit records, and the course you will adopt, as well as particulars of your arrangements for the possible need of retreat, so that in case of accident to the ship or detention we shall be able to use our best endeavors to carry out your wishes in this respect.

21. In an enterprise of this nature much must be left to the discretion and judgment of the commanding officer, and we fully confide in your combined energy and prudence for the successful issue of a voyage which will command the attention of all persons interested in navigation and science throughout the civilized world. At the same time, we desire you constantly to bear in mind our anxiety for the health, comfort, and safety of all entrusted to your care.

22. While employed on this service you are to take every opportunity of acquainting us with your progress and your requirements.

23. In the unfortunate event of any fatal accident happening to yourself or of your inability, from sickness or any other cause, to carry out these instructions, the command of the ship and of the expedition will devolve on Lieutenant Armitage, who is hereby directed to assume command and to execute such part of these instructions as have not been already carried out at the time of his assuming command. In the event of a similar accident to Lieutenant Armitage, the command is to devolve on the executive officer next in seniority on the articles, and so on in succession.

24. All collections and all logs (except the official log), journals, charts, drawings, photographs, observations, and scientific data will be the joint property of the two societies, to be disposed of as may be decided by them. Before the final return of the expedition you are to demand from the naval staff all such data, which are to be sealed up and delivered to the two presidents or dealt with as they may direct. The director of the civilian scientific staff will be similarly responsible for the journals, collections, etc., of the officers under his control. You and the other members of the expedition will not be at liberty without our consent to make any communication to the press on matters relating to the affairs of the expedition, nor to publish independent narratives until six months after the issue of the official narrative. All communications are to be made to us, addressed to the care of the secretary of the National Antarctic expedition, London.

25. The *Discovery* is not one of His Majesty's ships, but is registered under the Merchant Shipping Act, 1894, and is governed by it. Copies of this act will be supplied to you. You will see that the officers and crew sign the ship's articles as required by the act. The scientific staff will not sign articles, but are to be treated as cabin passengers. You must be careful not to take more than 12 persons as passengers.

26. The vessel has been covered by insurance, and, in the event of her sustaining any damage during the voyage, to recover the claim from the underwriters it will be necessary for you to call in the services of Lloyd's agent, or, in his absence, an independent surveyor, at the first port of call, in order that the damage may be surveyed before repairs are effected. His survey report, together with the accounts for repairs and supporting vouchers, should be sent to us by first mail, together with a certified extract from the official log reporting the casualty.

In the event of damage occurring after you have left civilized regions precise particulars should be entered in the log, and the damage should be surveyed and repaired as soon as you return to a port where Lloyd's agent or other surveyor is available.

27. The *Discovery* is the first ship that has ever been built expressly for scien-

tific purposes in these kingdoms. It is an honor to receive the command of her; but we are impressed with the difficulty of the enterprise which has been entrusted to you and with the serious character of your responsibilities. The expedition is an undertaking of national importance, and science cannot fail to benefit from the efforts of those engaged in it. You may rely upon our support on all occasions, and we feel assured that all on board the *Discovery* will do their utmost to further the objects of the expedition.

INSTRUCTIONS TO THE SCIENTIFIC DIRECTOR OF THE CIVILIAN SCIENTIFIC STAFF

1. The Royal Society and the Royal Geographical Society have approved your appointment as director of the civilian scientific staff of their Antarctic expedition.

2. A copy of the instructions to the commander of the expedition accompanies these instructions, which are supplemental to them. You will see from the instructions to the commander what the objects of the expedition are, and your position relatively to them.

3. You will direct the scientific work of the gentlemen who have been appointed to assist you.

4. The names of the gentlemen associated with you are as follows: (1) Mr. Hodgson, biologist; (2) Mr. Shackleton, physicist. The services of the two medical officers will be at your disposal for scientific work when not engaged on the work of their own department, namely, Dr. Koettlitz, botanist, and Dr. Wilson, zoölogist.

5. You will note that the commander of the expedition has been instructed to communicate freely with you on all matters connected with the scientific objects of the expedition, and, as far as possible, to meet your views and wishes in connection with them. The societies feel assured that you will coöperate and act in concert with him, with a view, as far as possible, to secure the success of an enterprise which it is hoped will be attended with important results in the various branches of science which it is intended to investigate.

6. All collections, logs, journals, charts, drawings, photographs, observations, and scientific data will be the joint property of the two societies, to be disposed of as may be decided by them. Before the final return of the expedition you are to demand from the staff under your control all such data, which are to be sealed up and delivered to the two presidents or dealt with as they may direct. On the return of the expedition you will be expected to superintend the distribution of specimens to specialists approved of by the two councils or their representatives and to edit the resulting reports. You will also be expected to contribute a report on the scientific results of the expedition for the official narrative. As it may be desirable during the progress of the voyage that some new scientific discovery should be at once made known in the interest of science, you will in such a case inform us of it by the earliest opportunity.

7. You and the other members of the expedition will not be at liberty, without our consent, to make any communication to the press on matters relating in any way to the affairs of the expedition, nor to publish independent narratives until six months after the issue of the official narrative. All communications are to be made to us, addressed to the care of the secretary of the National Antarctic expedition, London.

8. Should any vacancies in the scientific staff occur after the expedition has sailed from England, you may, with the concurrence of the commander, make such arrangements as you think desirable to fill the same, should no one have been appointed from England.

9. You and the members of the scien-

tific staff will be cabin passengers, joining the expedition at your own risk, and neither the owners nor the captain are to be responsible for any accident or misfortune which may happen to you. You will obtain from each member a letter to this effect.

The instructions are signed by the presidents of the Royal Society and the Royal Geographical Society.

URBAN POPULATION OF UNITED STATES*

THE city population of the United States during the ten years ending with the last census increased by nearly 37 per cent, in actual numbers 7,642,817, while the increase in the total population of the country during the same period was not quite 21 per cent.

In 1900 there were 160 cities, 161 including Honolulu, having a population of over 25,000. Of this number nineteen cities contained 200,000 inhabitants or more, nineteen cities had between 100,000 and 200,000 inhabitants, forty cities had between 50,000 and 100,000, and eighty-three had between 25,000 and 50,000. A recent bulletin of the Census Bureau, prepared under the direction of William C. Hunt, gives some interesting facts and figures relative to growth of the city population in the United States.

In 1890 there were 124 cities which had a population of 25,000 or more, but of these cities Brooklyn and Long Island City now form a part of New York city, showing a net gain of thirty-nine cities in 1900, as compared with 1890. Of the 124 cities in 1890, sixteen had 200,000 inhabitants or more, twelve had between 100,000 and 200,000 inhabitants, thirty had between 50,000 and 100,000 inhabitants, and sixty-six had between 25,000 and 50,000.

In 1880 there were but twenty cities which contained more than 100,000 inhabitants, but in 1890 this number had increased to twenty-eight, and in 1900 to thirty-eight.

In 1900 there were seventy-eight cities of 50,000 inhabitants or more, as compared with fifty-eight in 1890 and thirty-five in 1880.

The nineteen cities of the first class comprise New York, which, with more than 3,000,000 inhabitants, properly stands by itself; two cities, Chicago and Philadelphia, each of which has a population in excess of a million; three cities, St. Louis, Boston, and Baltimore, which have a population of half a million each; five cities, Cleveland, Buffalo, San Francisco, Cincinnati, and Pittsburg, which have a population of between 300,000 and 400,000 each, and eight cities, New Orleans, Detroit, Milwaukee, Washington, Newark, Jersey City, Louisville, and Minneapolis, which have a population of between 200,000 and 300,000 each.

The following-named States and Territories in 1900 do not contain any city with a population of 25,000 or more: Arizona, Idaho, Indian Territory, Mississippi, Nevada, New Mexico, North Carolina, North Dakota, Oklahoma, South Dakota, Vermont, and Wyoming.

Of the whole number of cities having 25,000 inhabitants or more in 1900, 70 are found in the North Atlantic division, 49 in the north central division, 18 in the south central division, 12 in the western division, 11 in the South Atlantic division, and 1 in Hawaii. Massachusetts has the largest number of such cities, namely, 20, and is followed by Pennsylvania with 18 and New York with 12.

The most significant growth of cities

* Census Bulletin No. 70.

is that for the three cities in the State of Washington, namely, Seattle, Spokane, and Tacoma. These three cities combined had only 4,981 inhabitants in 1880, but their population had increased to 98,765 in 1890, and to 155,233 in 1900, the increase during the past decade being equivalent to 57.2 per cent.

Nebraska is the only State in which the combined population of the cities contained therein shows a decrease from 1890 to 1900.

There were in 1790 but six places having 8,000 inhabitants or more, containing in all but 131,472 persons, or only 3.4 per cent of the total population at that census. At the census of 1830 the proportion of the total population living in places of like size had been increased to 6.7 per cent, representing 864,509 persons living in 26 places out of a total population for the entire country of 12,856,020. At the census of 1850 there were 2,897,586 persons living in 85 places of upward of 8,000 inhabitants, equivalent to 12.5 per cent of the entire population, which comprised then 23,191,876 persons. In 1880 the proportion, as compared with 1850, had nearly doubled, there being, out of a total population of 50,155,783 at that census, 11,318,547 persons, or 22.6 per cent, living in 286 such places. During the succeeding decade there was a very large increase in urban population, so that at the census of 1890 very nearly 30 per cent of the population was found living in 447 cities or equivalent incorporations of 8,000 inhabitants or more, comprising, as before stated, 18,272,503 persons out of a total population of 62,622,250.

The proportion of urban population has increased during the past ten years at a less rapid rate, there being, according to the figures of the present census, not quite one-third (33.1 per cent) of the population now living in places of 8,000 inhabitants or more, exclusive of Alaska, Indian Territory, Indian reservations, Hawaii, and persons enumerated at stations abroad.

There has been a notable increase since 1890 in the proportion of urban population in the North Atlantic division of States, considered as a whole, and this statement is true, in a somewhat less degree, of the north central division; 58.6 per cent of the total population of the North Atlantic division and 30.6 per cent of that of the north central division in 1900 live in places of 8,000 inhabitants or more, as compared with 51.7 per cent for the former and 25.9 per cent for the latter division at the census of 1890.

In Rhode Island 81.2 per cent of the population in 1900 live in cities or towns of 8,000 inhabitants or more, while this element also constitutes 76 per cent of the population in Massachusetts, 68.5 per cent in New York, 61.2 per cent in New Jersey, and 53.2 per cent in Connecticut. These are the only States, aside from the District of Columbia, in which the proportion of urban population, measured on this basis, is greater than one-half of the total population in 1900, but in Pennsylvania, Delaware, Maryland, Illinois, and California there is between 40 and 50 per cent of the total population living in places of this size.

E. O. Hovey, associate curator of the American Museum of Natural History of New York, is at work in western South Dakota collecting Jurassic fossils for the museum.

Prince Henry of Orleans, who with Bonvalot traversed Tibet in 1890, died at Saigon, French Cochin China, on August 9. The prince had also traveled extensively in Campodia and Tonkin.

GEOGRAPHIC NOTES

THE BALLOON AS AN AID TO EXPLORATION

IT might not be inappropriate at the present time, in view of M. Santos Dumont's success in aerial navigation, to recall the argument of the famous American aeronaut Wise in favor of the use of balloons in exploration.

"If, for instance," writes Mr. Wise, in "A System of Aeronautics," 1850, "we take a balloon of limited size, about 18 feet in diameter each way, it will, when inflated with hydrogen gas, be capable of raising 160 pounds, independent of its own weight. Now, if this be so fastened to a man's body, as not to interfere with the free use of his arms and legs, he may then ballast himself so as to be a trifle heavier than the upward tendency of the balloon, which will be nearly in equilibric." . . . "He may then bound against the earth with his feet so as to make at least a hundred yards at each bound.

"This the writer has often done, in the direction of a gentle wind, with the aid of his feet alone, after his balloon had descended to the earth; and, on one occasion, traversed a pine forest of several miles in extent, by bounding against the tops of the trees. Such a contrivance would be of inestimable value to exploring expeditions. Landings to otherwise inaccessible mountains; escapes from surrounding icebergs; explorations of volcanic craters; traversing vast swamps and morasses; walking over lakes and seas; bounding over isthmuses, straits, and promontories, or exploring the cloud-capped peaks of Chimborazo, could thus all be easily accomplished."

POPULATION OF CANADA

THE population of the Dominion of Canada is given by the recent census as 5,338,883, an increase of 505,644, or about 10½ per cent, during the last ten years. The population of the provinces is as follows:

Provinces.	1891.	1901.
British Columbia	98,173	190,000
Manitoba	152,506	246,464
New Brunswick	321,263	331,093
Nova Scotia	450,396	459,116
Ontario	2,114,321	2,167,978
Prince Edward Island	109,078	103,258
Quebec	1,488,535	1,620,974
Territories	66,799	145,000
Unorganized territories	32,168	75,000

The population of the principal cities of Canada, by municipal boundaries, is as follows:

Cities.	1891.	1901.
Montreal	220,181	266,826
Toronto	181,220	207,971
Quebec	63,090	68,834
Ottawa	41,154	59,902
Hamilton	48,980	52,550
Winnipeg	25,639	42,336
Halifax	38,495	40,787
St. John	39,179	40,711
London	31,977	37,983
Victoria	16,841	20,821
Kingston	19,263	18,040
Vancouver	13,709	26,196
Brantford	12,753	16,631
Hull	11,264	13,988
Charlottetown	11,373	12,080
Valleyfield	5,515	11,055
Sherbrooke	10,097	11,765
Sydney	2,427	9,908
Moncton	5,165	9,026
Calgary	3,876	12,142
Brandon	3,778	5,738

A study of the population by families compared with 1891 is very interesting. In nearly every province the per cent of increase by families is considerably greater than the per cent of increase of the actual population.

Provinces.	1891.	1901.
British Columbia	20,718	30,000
Manitoba	31,786	48,590
New Brunswick	58,462	62,700
Nova Scotia	83,730	89,106
Ontario	414,796	451,839
Prince Edward Island	18,601	18,746
Quebec	271,991	303,301
Territories	14,415	29,500
Unorganized territories	32,168	75,000

The dwellings are as follows:

Provinces.	1891.	1901.
British Columbia	20,016	38,000
Manitoba	30,790	47,903
New Brunswick	54,718	58,227
Nova Scotia	79,102	85,032
Ontario	406,946	440,419
Prince Edward Island	18,389	18,530
Quebec	246,644	287,533
Territories	14,129	28,300

The returns for extreme northern portions of Quebec and Ontario and for the unorganized territories of Athabasca, Franklin, Keewatin, MacKenzie, Ungava, and Yukon have not been received.

COAL IN THE UNITED STATES

THE output of coal in the United States for 1900 for the second successive year surpassed the output of Great Britain during the same period. Mr. Edward W. Parker, statistician of the U. S. Geological Survey, reports the total output in 1900 in the United States as 267,542,444 short tons, an increase over the preceding year of 13,802,452 tons, or a little more than 5 per cent. The output in Great Britain for the year was 15,000,000 short tons less. West Virginia showed the largest increase in tonnage, her output exceeding 21,000,000 tons for the first time. Ohio showed the next largest increase, and Alabama, Arkansas, the Indian Territory, Michigan, and Utah also made very notable gains. The output in Kansas increased by 600,000 tons, or 16 per cent, and that of Kentucky by 575,000 tons, or 12 per cent.

The following table, prepared by Mr. Parker, gives the production and value of coal (in short tons) in the different States in 1900:

	Production.	Value.
Alabama	8,393,385	$9,745,722
Arkansas	1,441,345	1,653,818
California	171,708	523,231
Colorado	5,232,643	5,848,339
Georgia and North Carolina	333,291	370,022
Illinois	25,153,929	22,529,665
Indiana	6,449,645	$6,645,739
Indian Territory	1,918,572	2,782,838
Iowa	5,237,634	7,202,986
Kansas	4,453,107	5,368,642
Kentucky	5,181,917	4,730,698
Maryland	4,024,688	3,927,381
Michigan	849,455	1,259,683
Missouri	3,269,491	4,015,980
Montana	1,661,775	2,713,707
New Mexico	1,299,099	1,775,570
North Dakota	129,883	158,358
Ohio	19,105,408	19,403,362
Oregon	58,864	220,001
Pennsylvania:		
Anthracite	57,107,660	82,993,471
Bituminous	79,616,346	77,166,158
Tennessee	3,731,617	4,215,080
Texas	968,373	1,581,914
Utah	1,146,277	1,445,415
Virginia	2,137,007	1,757,525
Washington	2,474,093	4,700,068
West Virginia	21,980,430	17,698,734
Wyoming	4,014,602	5,457,953

Adolf Erik Nordenskjold, the first and only explorer to accomplish the Northeast Passage, died at his home, in Stockholm, on Tuesday, August 13. Nordenskjold was born 69 years ago at Helsingfors, the capital of Finland. He had but reached the age of manhood when he fell under the suspicion of the Russian authorities and was compelled to leave the country. He settled in Sweden and soon became interested in Arctic exploration. Nordenskjold had already spent 20 years adding to the maps of Greenland, Spitzbergen, and the Kara Sea, which he was one of the first to penetrate, when he determined to reach Bering Strait by crawling around the headlands and islands of northern Asia. Without any hindrance he had arrived almost in sight of the strait when the tantalizing ice closed in before him, and for ten months his ship was held motionless. Then the ice mass opened and allowed the *Vega* to sail the few remaining miles to and through the strait and thus to complete the Northeast Passage (1879). He did a great deal to promote navigation along the north coast of Siberia and to lead commerce to the mouths of the great Siberian rivers—Obi, Yemsei, and Lena.

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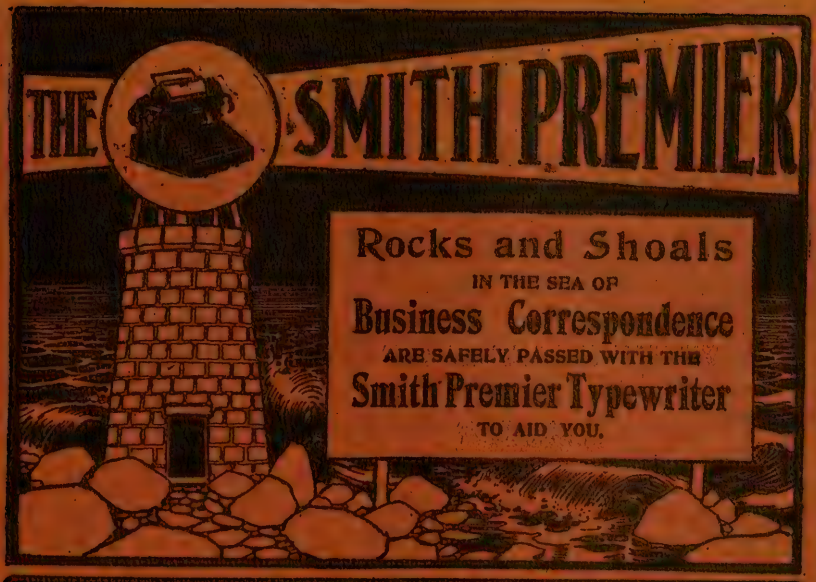

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CONTENTS

	PAGE
NEXT INTERNATIONAL GEOGRAPHICAL CONGRESS TO BE HELD IN WASHINGTON. ILLUSTRATED	351
PEARY'S WORK IN 1900 AND 1901. ILLUSTRATED	357
THE WEATHER BUREAU. BY WILLIS L. MOORE, CHIEF U. S. WEATHER BUREAU	362
WORK OF THE BUREAU OF AMERICAN ETHNOLOGY. BY W J McGEE, ETHNOLOGIST IN CHARGE	369
BOUNDARIES OF TERRITORIAL ACQUISITIONS. WITH MAP	373
THE GERMAN SOUTH POLAR EXPEDITION. BY DR. GEORG KOLLM, EDITOR AND SECRETARY OF THE GEOGRAPHICAL SOCIETY AT BERLIN	377
NATIONAL GEOGRAPHIC SOCIETY CALENDAR, 1901–1902	379
GEOGRAPHIC NOTES	380

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THE NATIONAL GEOGRAPHIC MAGAZINE

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most honored and best beloved of Americans
an honorary member of the National Geographic Society
died from an assassin's bullet September 14, 1901
in the fifty-ninth year of his age

R. I. P.

Vol. XII, No. 10 WASHINGTON October, 1901

THE NATIONAL GEOGRAPHIC MAGAZINE

NEXT INTERNATIONAL GEOGRAPHICAL CONGRESS TO BE HELD IN WASHINGTON

THE next International Geographical Congress will be held in Washington under the auspices of the National Geographic Society. The acceptance of the invitation extended by the Society has just been received by President Graham Bell from Baron von Richthofen, President of the Executive Committee of the last Congress. This will be the first time the Congress will have assembled in the Western Hemisphere, so that the event will be of much importance to American geographers. The Congress will not be held until 1904, which will allow ample time for the preparation of a program and of a series of excursions to points of geographic interest.

The object of the Geographical Congresses is to stimulate interest in geographic work, and also to promote harmony in methods of work. It is now thirty years since the first Congress was held, at Antwerp. In 1869 the people of Belgium, by popular subscription, had raised a fund to erect statues to the great Flemish geographers, Mercator and Ortelius. The feeling that the work of these famous men of the sixteenth century deserved more than local homage led to the arrangement for an international festival at Antwerp in their honor. The festival took place August 14–22, 1871. Many geographers from many nations gathered in the old Flemish town, and at the meeting papers of much scientific importance were read. So great was the interest and enthusiasm of all, and so apparent the advantage of such a meeting of geographers of all nations, most of them with different ideas and different methods, that a resolution was passed to continue the Congress periodically. The name given to the first Congress was "Congrés des Sciences geographiques, cosmographiques, et commerciales," the importance of the commercial element in a strictly geographical sense being thus recognized definitely.

At this time a revival in popular interest in explorations swept over Europe. The discoveries of Livingstone during the preceding years in the heart of Africa had awakened the world to the immense unknown portions of the earth's surface. Then came Stanley's march across Africa and the tremendous

excitement aroused by his discoveries of millions of people along the Kongo. Geographical societies were founded everywhere. In the ten years from 1871 to 1880 thirty-nine important societies were founded, whereas only about twenty had existed before that decade. Chairs in geography were established at different universities, and the applications of geography to education, to commerce, and to national policy were everywhere recognized.

The second Congress was held in Paris in 1875. Ferdinand de Lesseps, then at the height of his fame, President of the Geographical Society of Paris, presided. The meeting marked an advance in enthusiasm and numbers.

The third met at Venice, six years later. It was carried out on a grander scale than either of its predecessors and was given national importance by the Italians. The King and Queen of Italy and the highest political officials were present at the opening ceremony. The Congress was specially noted for the magnificent exhibition organized by the Italian Geographical Society.

In connection with the Paris Exhibition of 1889 an international conference on geography was held, which was afterward adopted as the fourth International Geographical Congress. Some very valuable papers summarizing the geographic work done by the principal nations of Europe during the nineteenth century were presented to the conference.

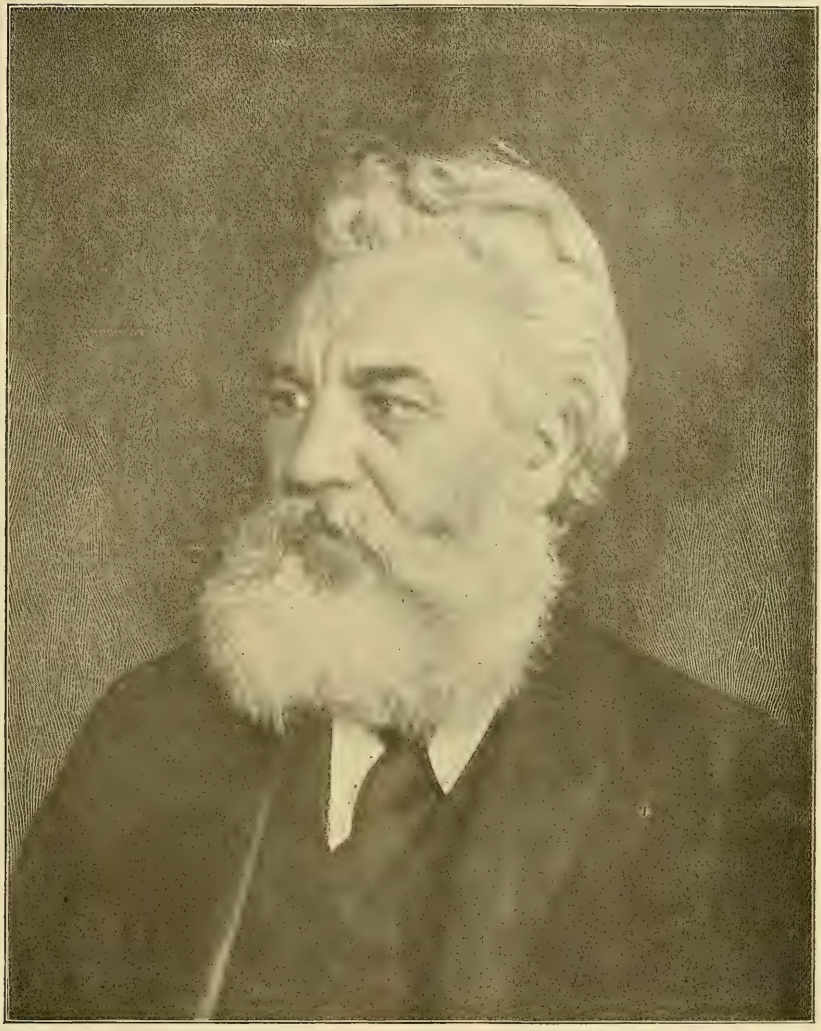
In the summer of 1891 the city of Berne celebrated the seventh centenary of the foundation of the town, and, at the earnest invitation of its citizens, the fifth Geographical Congress was held in connection with the celebration. A good exhibition of maps and geographical text books, for the most part by Swiss geographers, was the chief feature of interest. At this Congress the members voted to hold future meetings not oftener than once in three years or more rarely than once in five.

London was the scene of the sixth Congress, which was held under the auspices of the Royal Geographical Society. This was the first Geographical Congress at which the National Geographic Society had representatives, for at the time of the preceding meeting the society had been in existence but three years. Gen. A. W. Greely, U. S. A.; Mr. W. W. Rockhill, and Miss Eliza R. Scidmore represented the Society at this meeting. Polar explorations received considerable discussion, in which, naturally, General Greely took a prominent part.

Meantime there had been a growing feeling that the part played by Americans in the promotion of exploration should be recognized by a meeting of the Congress in the United States, and at this Congress a cordial invitation by the National Geographic Society to hold the next meeting in Washington was in the hands of our representatives. It was deemed advisable, however, to convene in Berlin.

At the Congress held at Berlin in the summer of 1899 as many as 1,600 persons were enrolled as members actually in attendance. Baron von Richthofen, president of the Geographical Society of Berlin, and recently appointed Foreign Minister of Germany, presided over the sessions of the Congress, which were held in the building of the Prussian House of Representatives. One pleasant feature of the meeting was a series of excursions to points of geographic interest within a few hours of Berlin. The National Geographic Society was represented by the following members: Hon. Andrew D. White, United States Embassador to Germany; Gen. A. W. Greely; Dr. Marcus Baker, of the U. S. Geological Survey; Prof. Wm. M. Davis, of Harvard University, and Miss Eliza R. Scidmore.

The invitation of the Society to hold the next Congress in Washington under its auspices was informally renewed.

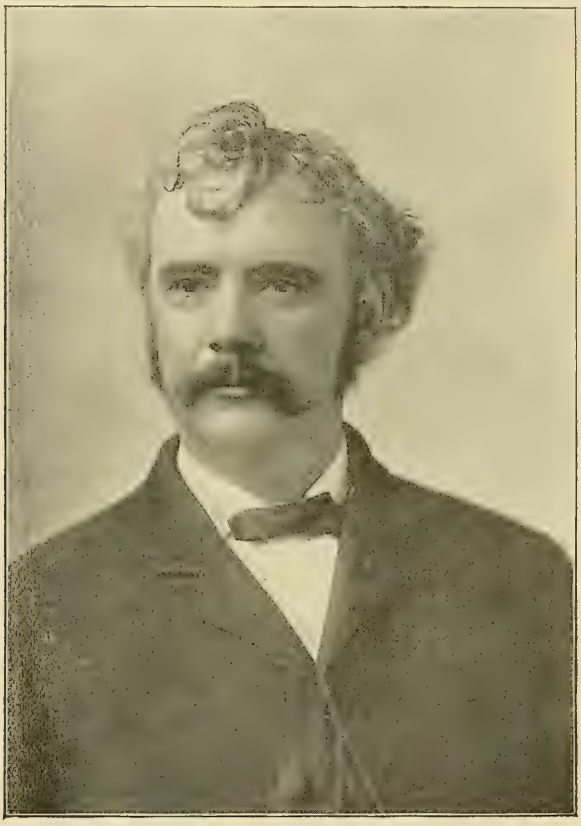


Alexander Graham Bell, LL. D.

President National Geographic Society

Later a formal invitation was extended by President Graham Bell on behalf of the Society. By the courtesy of Hon. Andrew D. White the invitation was presented to Baron von Richthofen and has been accepted by the Executive Committee. As President von Richthofen in his letter of acceptance says, "There is indeed no place better fitted for geographers to assemble than Washington, which is the great center of scientific geographical exploration in America and the distinguished workshop of a considerable number of eminent men."

It is in fact appropriate that the enormous part contributed by Americans to geographic progress during the past century and the present activity in geographic lines of work maintained by the United States Government, by geographic societies, and by private enterprise should be recognized by a meeting of the geographers of the world in the center of geographic enterprise in the Western Hemisphere.



W J McGee, LL. D.

Vice-President National Geographic Society

In this limited space it is possible to mention only one of the achievements by Americans in exploration. At the time of the Louisiana Purchase, in 1803, the immense tract to the west of the Mississippi was a blank on the maps, even the existence of the Rocky Mountains was not hinted at in the geographies and atlases of the time; but today almost every mile in this vast territory is as well known as England or France. And on the other continents Americans have done their share—in Africa, in Asia, and in the polar regions.

But the purposes of a Geographical

Congress deal more with the present than the past. Today the United States Government spends annually several millions of dollars for scientific research, nearly every dollar of which goes toward geographic progress. The Smithsonian Institution, with its great museums and splendid Bureau of Ethnology; the Geological Survey, the Coast and Geodetic Survey, the Weather Bureau, the Fish Commission, the Census Bureau, the General Land Office, the Biological Survey, the Hydrographic Office, the Bureau of Forestry, the great bureaux of Statistics and Commerce of the Treasury Department and of the Department of Agriculture, and the Division of Military Information of the War Department, are among the institutions engaged in promoting geographic research.

Gen. A. W. Greely, U. S. Army

Gold Medalist of the Royal Geographical Society and of the Société de Géographie de Paris

The National Geographic Society of America, the host of the next International Geographical Congress, represents

every section of the country in its membership. Within a few days the cornerstone will be laid of a large and handsome structure, the Hubbard Memorial Building, which is to be its home in Washington. Because of its central location the Society is fortunate, in that it can have the assistance, in making the Congress a success, of the other geographic societies of America, of whose hearty cöoperation it has been assured. It has been suggested, and it is to be

Hon. Seth Low

President American Geographical Society

hoped it may be found practicable, to hold sessions of the Congress also in other cities: In New York, in conjunction with the American Geographical Society of that city, a portrait of whose honored president, Dr. Seth Low, appears on another page; in Boston, with the Appalachian Mountain Club, and in Philadelphia, Chicago, and probably in San Francisco and Seattle, in conjunction with the noted geographic societies of these cities.

The National Geographic Society will hope to offer its guests an attractive series of excursions to points of geographic interest. In the letter of invitation the following possible excursions, each one of which would be a geographic lesson, are suggested:

"While it might be premature to suggest special excursions to points and regions of geographic interest, your attention is asked to the fact that Washington is situated in the midst of natural and cultural features of such character as to appeal to geographic students. Niagara Falls is but a few hours in one direction, the Natural Bridge of Virginia is near at hand in another, and the Mammoth Cave of Kentucky but a short journey in a third direction. The metropoles of eastern United States — Boston, New York, Philadelphia, Baltimore, Richmond—are so near that it would be possible to hold a session in one or more of these cities.

"Chicago is only 1,300 kilometers (23 hours) away, and a session might easily be held there. Denver, the gateway to the Rocky Mountain region, is within 3,000 kilometers (2¼ days), and the Grand Cañon of Colorado, Great Salt Lake, and Yellowstone National Park are only a little farther. Even the remotest parts of the country are now easily accessible. California is but 4,350 kilometers (3⅓ days) from Washington at The Needles and 4,900 kilometers (3¾ days) at Los Angeles, while San Francisco, at the Golden Gate, is only a little over four days from the National Capital. From these points Mt. Shasta and Yosemite Valley are readily accessible, while the notable scenery of the Selkirks and other mountains in Canada, the peaks and glaciers of Alaska, and the picturesque plateaus and historic cities of Mexico are also within easy reach, the City of Mexico being only 4,600 kilometers (3½ days) from Washington.

"The members of the National Geographic Society feel that these and other features of geographic interest are worthy the attention of the distinguished savants accustomed to attend the sessions of the International Geographic Congress, and they would feel highly honored by the occasion of welcoming their colleagues from beyond the Atlantic to their own field of work and thought." G. H. G.

PEARY'S WORK IN 1900 AND 1901

"PEARY has circumsledged Greenland, discovered most northern land in the world. Returns 1902 with Pole," says Mr. Bridgman, Secretary of the Peary Arctic Club, in a telegram to the NATIONAL GEOGRAPHIC MAGAZINE from Sydney, C. B., September 13, 1901.

A detailed statement of Peary's very important work during the past two years follows:

On April 15, 1900, Peary left Fort Conger, 81° 44′ north latitude, and, accompanied by his faithful Henson and five Eskimo, crossed Robeson Channel to the Greenland coast and followed it

on foot and over the sea ice to the northward. He had devised an ingenious scheme for making his little force as mobile as possible. Each sled was stocked with a complete outfit of provisions as though it were the only store from which the party had to draw. All hands used from it until it was emptied, when it was sent back in charge of its Eskimo driver and drawn by only two of the dogs. The other dogs were attached to the remaining sleds. In this way two of the Eskimo were sent back on April 26, and two others early in May.

Lockwood's farthest North Cairn of May 13, 1882, was opened May 8, and its records were taken; and at Cape Washington, the headland seen by him fifteen miles northeast, in 1882, another cairn was erected and a copy of the "Farthest" record and additional memoranda were deposited. Peary pushed on, and at 83° 39″ north rounded the northern extremity of Greenland, finding the coast at this point to trend rapidly eastward. There, on the most northerly known land in the world, Peary built a cairn, in which he deposited records, etc.

Peary then struck over the sea ice for the Pole, but was able to advance only to 83° 50′ north, when he was stopped by the broken pack and much open water. Retracing his steps, Peary pushed on along the Greenland coast, all the time eastward, about 160 miles beyond Lockwood's farthest, to latitude 83° north, longitude 25° west, or approximately but little more than a degree from Independence Bay, discovered and named by him July 4, 1892. The reconnaissance ended with a definite demonstration of the western and northern coasts of Greenland.

A pronounced change in the character of the coast was found beyond Cape Washington, the bold, precipitous headlands and deeply cut fjords being succeeded by a low rolling foreland, suggesting possible glaciation at some earlier period; and all along the northern coast much open water was met. Bear, musk oxen, hare, and lemming were killed in the newly discovered country, affording an ample supply of fresh meat for men and dogs; and a stray wolf was seen. Having practically connected his work of eight years before with that of 1900, and completed the determination of the northern boundary of Greenland, Peary, on May 22, turned back, following practically the line of his outward march, and on June 10 arrived at Fort Conger, having been three months in the field without accident, illness, or serious mishap of any kind to himself or any of his party.

Peary's own estimate of his work in 1900 is given in a letter to Mr. H. L. Bridgman, from which the following extracts are taken:

"CONGER, *April 4, 1901.*

"MY DEAR BRIDGMAN: It gives me great pleasure to present to the club the results of the work of 1900.

"First. The round of the northern limit of the Greenland archipelago, the most northerly known land in the world; probably the most northerly land.

"Second. The highest latitude yet attained in the Western Hemisphere (83° 50′ north).

"Third. The determination of the origin of the so-called 'paleocrystic ice' (floe berg), etc.

"Considering that I am an old man, have one broken leg and only three toes, and that my starting point was Etah, I feel that this was doing tolerably well. It is almost a thousand years since 'Eric the Red' first sighted the southern extremity of the archipelago, and from that time Norwegians, Dutch, Danes, Swedes, Englishmen, Scotchmen, and Americans have crept gradually northward up its shores, until at last, through the instrumentality and liberality of the club, its northern cape

Lieut. Robert E. Peary

has been lifted out of the Arctic mists and obscurity. It seems fitting that this event, characterized by Sir Clements Markham as second in importance only to the attainment of the Pole itself, should fall in the closing year of the century. If I do not capture the Pole itself in this spring's campaign, I shall try it again next spring. My gratitude and respects to all the members of the club.

"Always most sincerely,

"PEARY."

"Dr. Dedricht takes this letter south, to be sent by natives to Cape York, thence by whaler to the British consul at any civilized port."

Peary sends to the club a complete and detailed chart of his newly discovered coast and other work, reserving until the completion of his work the nomenclature and its publication.

Having eliminated the Greenland archipelago as a desirable route to the Pole, and no further advance northward being possible until the opening of the season of 1901, Peary decided that his next attempt would be from Cape Hecla, the northern port of Grinnell Land, and from Fort Conger as a base. Deciding thus to winter at Conger, the autumn

Mrs. Josephine D. Peary

was spent in hunting and obtaining the necessary fresh meat for men and dogs. So diligently was this work prosecuted that it was not suspended on the approach of Arctic night, and hunting parties were actually in the field during every moon of the winter. Game, principally musk oxen, was found much more abundant in the Lake Hazen country, thirty or forty miles westward of Fort Conger, than in its immediate vicinity, and it proved more feasible, therefore, to subsist the dogs where the meat was killed than to pack it across the country to the coast. Snow igloos were built, and in these Peary and his hunters practically spent most of the winter, the rations of the hunters being supplemented from the supplies found at Conger. In all, nearly 200 musk oxen were killed and either consumed by the expedition or packed for its later demands.

Peary, accompanied, as in the previous year, by Henson and five Eskimo, left Conger April 5, 1901, for the north by the way of Cape Hecla; but after some ten days' march along the ice both the men and dogs proved to be out of condition and unfit for the most arduous work certainly ahead of them. Unwilling to risk the success of the undertaking with an inadequate force, or to imperil the lives of any of his party, Peary retraced his steps and returned in good order and without loss to Fort Conger. Late in April, with his entire force, Peary retreated southward to open, if possible, communication with the club's steamer of 1900, from which nothing had been heard. The *Windward*, fast in her winter quarters at Payer Harbor, near Cape Sabine, with Mrs. Peary and Miss Peary on board, prisoners in the ice for nearly eight months, was reached May 6, and in her Peary made his headquarters until the auxiliary ship of 1901 should arrive.

Open water came early at Cape Sabine, and July 3 the *Windward* extricated herself from the ice and, crossing to the east side of Smith Sound, devoted July to a successful hunt for walrus in Inglefield Gulf to provide food for natives and dogs during the fieldwork of 1902. One hundred and twenty-five were captured and landed at Cape Sabine, the *Windward* recrossing the sound to Etah, Peary's headquarters of 1899–1900, where she awaited the *Erik*, which arrived on August 4, fourteen days from Sydney, C. B. After several weeks of further preparation at Etah, the *Erik* carried Peary across Smith Sound and landed him and his equipment and supplies on the south side of Herschel Bay, ten miles south of Cape Sabine, his headquarters for next winter.

Peary's winter arrangements at Cape Sabine insure comfort, and, with an ample supply of provisions pushed along the route to Fort Conger, he expects to take the field with the returning light of 1902, fully rested and in the best possible condition.

During the entire two years since he had been heard from Peary's health was excellent, and the accident to his feet at Fort Conger, in 1899, caused him but slight inconvenience and in nowise impaired his efficiency in the field. During the autumn he expects to make an extensive reconnaissance of the interior and the western coast of Ellesmere Land, with a strong probability of discovering natives hitherto unknown to white men.

THE WEATHER BUREAU*

By Willis L. Moore, LL. D., Chief U. S. Weather Bureau

ABOUT the only knowledge that most people have of the workings of the United States Weather Bureau of the Department of Agriculture is gathered from the daily prediction of rain or snow that they encounter at the breakfast table as they glance over the morning paper. They base their estimate of the utility of the weather service on the accuracy of the predictions thus hastily scanned, and many are prone to inquire whether it is true that this service has really made a place for itself in the great industrial economy of our country; whether or not an adequate return is made for the expenditure of over $1,000,000 annually; whether the science of weather forecasting has reached its highest degree of accuracy, and whether it holds out possibilities of future improvement. They would doubtless be amazed if they knew the thousand and one ramifications through which it reaches, daily, probably more than one-half of our adult population.

The United States Government spends more for scientific research than any other country in the world. Today every wheel turns with scientific precision, and the arts, the manufactures, and the commerce of this wonderful country are, by the aid of systematic knowledge, being developed far beyond the dreams of the most optimistic person of a quarter of a century ago. The ingenuity of the Yankee and the skill of the American mechanic are only physical and outward manifestations of the inward spirit whose life has been called into existence by the many schools, colleges, and polytechnic institutions with which our broad land is dotted and which, through the knowledge that they reveal of the forces of nature, enable man to harness the invisible powers and make them obedient to his will. Probably in no way have we shown our aptitude in divining from apparent confusion some fundamental principles and in applying those principles to the commerce and the industry of our country more than in the development of the present meteorological service. Where but a few years ago man thought that chaos reigned supreme we are now, by the aid of simultaneous daily meteorological observations, able to trace out the harmonious relations of many physical laws that were previously but little understood.

DEVELOPMENT OF METEOROLOGICAL SCIENCE

It will be interesting to note that at the time of the founding of the first of the thirteen colonies, at Jamestown, Va., in 1607, practically nothing was known of the properties of the air or of methods for measuring its phenomena. It was not until 1643, twenty-three years after the landing of the Pilgrims on Plymouth Rock, that Torricelli discovered the principle of the barometer and rendered it possible to measure the weight of the superincumbent air at any spot where the wonderful, yet simple, little instrument might be placed. Torricelli's great teacher, Galileo, died without knowing why nature, under certain conditions, abhors a vacuum; but he had discovered the principle of the thermometer. The data from the readings of these two instruments form

* An address presented at the Convention of Weather Bureau Officials, Milwaukee, Wisconsin, August 27–29, 1901.

the foundation of all meteorological science. Their inventors as little appreciated the value of their discoveries as they dreamed of the great western empire which should first use their instruments to measure the inception and development of storms.

About one hundred years after the invention of the barometer, namely, in 1747, Benjamin Franklin, patriot, statesman, diplomat, and scientist, divined that certain storms had a rotary motion and that they progressed in a northeasterly direction. It was prophetic that these ideas should have come to him long before any one had ever prepared charts showing observations simultaneously taken at many stations. But, although his ideas in this respect were more important than his act of drawing the lightning from the clouds and identifying it with the electricity of the laboratory, his contemporaries thought little of his philosophy of storms. It remained for Redfield, Espy, Maury, Loomis, and Abbe, one hundred years later, to gather the data and completely establish the truth of that which the great Franklin had dimly yet wonderfully outlined. Although American scientists were the pioneers in discovering the rotary and progressive character of storms and in demonstrating the practicability of weather services, the United States was the fourth country to give legal autonomy to a weather service; but no one of the other countries had an area of such extent as to render it possible to construct such a broad synoptic picture of air conditions as is necessary in the making of the most useful forecasts. It would require an international service, embracing all the countries of Europe, to equal ours in the extent of area covered.

Congress authorized the first appropriation of $20,000 to inaugurate a tentative weather service in 1870. Gen. Albert J. Myer, to whom was assigned the chiefship of the new meteorological service, doubtless had no conception of the future wonderful extension of the system that he was then authorized to begin. It is comparatively easy, with the great system now at our command and with scientists who have had twenty years' experience in watching the development and progression of storms, to herald to the shipping and other industries of the United States forewarnings of coming atmospheric changes that may be destructive to either life or property. Former Secretary of Agriculture J. Sterling Morton did much to place the meteorological service of the Government on a suitable foundation by having all of its employés and higher officials classified and placed within the civil service. This was essential to the proper performance of the then existing duties of the service. The present Secretary of Agriculture, James Wilson, has continued the merit system in the Weather Bureau, and has greatly improved and extended its operations. Thanks to his policy of development, the Weather Service has had a phenomenal growth during the past four years.

EXPANSE OF ATMOSPHERIC FIELD SURVEYED BY THE FORECASTER

It is a wonderful picture of atmospheric conditions that is presented twice daily to the trained eye of the weather forecaster. It embraces an area extending from the Atlantic to the Pacific, from the north coast of South America over Mexico, the islands of the West Indies and the Bahamas, northward to the uttermost confines of Canadian habitation. It is a panoramic picture of the exact air conditions over this broad area that is twice daily presented to the study of our experts. Hurricanes, cold waves, hot waves, or rainstorms are shown wherever present in this broad area. Their development since last report is noted, and from the knowledge thus

gained their future course and intensity is quite successfully forecast. Every twelve hours the kaleidoscope changes, and a new graphic picture of weather conditions is shown. Nowhere else in the world can meteorologists find such an opportunity to study storms and atmospheric changes.

TANGIBLE RESULTS OF WEATHER BUREAU WORK

Has the Weather Bureau won its way into the hearts and confidence of the American people, and do we feel that the expenditures made for its support are wisely made? Let us answer this question by giving some facts relative to the number of people and industries that are daily in communication with the Bureau. In our Atlantic and Gulf ports, alone, there are floating over $30,000,000 worth of craft on any day of the year; and at every port, whether on the Atlantic, on the Pacific, or on the Lakes, there is either a full meteorological observatory or else a storm-warning displayman who attends to the lighting of the danger lights on the storm-warning towers at night, to the display of danger flags by day, and to the distribution of storm-warning messages among vessel masters. This system is so perfect that the Chief of the Weather Bureau, or the forecaster on duty at the Central office, can dictate a storm warning and feel certain that inside of one hour a copy of the warning will be in the hands of every vessel master in every port of material size in the United States, provided that it is his desire that a complete distribution of the warning be made. As a matter of fact, the storm warnings usually go only to a limited portion of the coast at one time. While the daily predictions of rain or snow, by which, as previously stated, the public measures the value of the weather service, are subject to a considerable element of error, namely about one failure in five predictions, the marine warnings of the service have been so well made that in over six years no protracted storm has reached any point of the United States without the danger warnings being displayed well in advance. As a result of these warnings the loss of life and property has been reduced to a minimum, being doubtless not more than 25 per cent of what it would have been without this extensive system, which comes daily, and almost hourly, into communication with mariners. The public does not appreciate this part of the service that, as a rule, these warnings do not appear in the newspapers because it is not desirable to publish them so far in advance as to unnecessarily hold shipping in port. We only aim to place warnings twelve to sixteen hours in advance of the coming of the storm, and then we communicate by telegraph, by messenger, and by warning lights and flags directly with the masters of vessels. It is a notable example of the utility of the new West Indian weather service, and of the wisdom of Congress in continuing as a perpetual instrument of peace the service organized to meet an emergency of war, that the Galveston hurricane was detected on September 1, at the time of its inception, in the ocean south of Porto Rico, and that the new system of West Indian reports gave us such complete simultaneous data that at no time did we lose track of the storm, and everywhere, as it progressed northward, such full information was given that, notwithstanding the extensive commerce of the Gulf of Mexico, little or no loss of life or property occurred upon the open waters of the Gulf, and the destruction at Galveston was many times less than it would have been without the premonition that was given and the activity of the Bureau's officers in urging the people to move from the low ground of the city to its more secure portions. Again, as this storm recurved and passed over the Lake region, the

storm warnings were so well distributed that, notwithstanding that the energy of the storm was so great that few vessels were stanch enough to live through its fury, shipping remained safely in harbor and there was not a life lost. These are some of the utilities of which the general public is not thoroughly informed.

COLD-WAVE WARNINGS

When a marked cold wave develops in the north plateau of the Rocky Mountains, and, by its broad area and great barometric pressure, threatens to sweep southward and eastward with its icy blasts, the meteorological stations of the Bureau are ordered to take observations every few hours in the region immediately in advance of the cold area, and to telegraph the same to headquarters. By this means every phase of the development of the cold area is carefully watched, and when the danger is great each observatory in the threatened region becomes a distributing center, from which warnings are sent to those who have produce or perishable articles of manufacture that need protection against low temperatures. In such cases the system of distribution is so perfect that it is not uncommon for the Bureau to distribute 100,000 telegrams and messages inside of the space of a few hours, so that nearly every city, village, and hamlet receives the information in time to profit thereby. What this means to the farmer and shipper is well illustrated by the fact that we gathered from those personally interested statements relative to the sweep of one cold wave, which showed that over $3,400,000 worth of property that would have been destroyed by the low temperatures was saved. To be sure, sometimes the surging of the great air eddies which constitute our rainstorms and cold waves—one the low-pressure eddy and the other the high-pressure eddy—deflects the course of the storm or minimizes the degree of cold, and the warnings may partially or wholly fail of verification; but in these important atmospheric disturbances the warnings are justified in such a large proportion of cases that those whose property is at stake do not longer question the utility of the Government service. That no other country brings its citizens into such close touch with its weather conditions is shown by the fact that even when severe storms are not imminent there is, in addition to the printing of the forecasts in the daily press, a daily distribution of 80,000 telegrams, maps, and bulletins, that place the information in the hands of millions whose personal interests are materially affected by the weather.

There are over 2,000 daily papers in the United States, and each one of these prints in a conspicuous place the daily weather predictions. Did it ever occur to you that there is no other information that receives publication and attention by readers each day of the year in every daily paper of the country? There are 47 tri-weekly papers in the United States, 434 semi-weekly, and 14,734 weekly publications, the greater number of which publish the weekly weather crop bulletins of the Bureau for their respective States. Each State forms a section of the national service, and from a central office issues monthly reports on the minute climatology of the State. This climatological data is gathered from standard thermometers and rain gages that are placed in each county. The information finds extensive publication also in the weekly and monthly periodicals.

VALUE OF THE WEATHER SERVICE TO RURAL INDUSTRIES

Few people realize what a complete system the Weather Bureau forms for the accurate and rapid collection and dissemination of crop information. It has 1,200 paid and skillfully trained officials outside of Washington, who are

quite evenly distributed over the continent and its island possessions, and who are available to report on any matters concerning weather, crops, climate, or statistics. It has 200 officials and employés at the central office in Washington. It has 180 fully equipped meteorological stations quite equidistantly scattered over the United States and its dependencies, each manned by from one to ten trained officials, which stations are not only weather observatories, but are centers for the gathering of statistical and climate and crop reports. It has a central observatory in each State and Territory to which all subordinate offices in the State report and to which all voluntary weather and crop observers report. These central observatories are equipped with printers, printing plants, trained meteorologists and crop writers, clerks, and messengers. During the past fifteen years the work of the substations and voluntary crop and weather observers has been so systematized under the State central offices that these centers constitute the most efficient means for the accurate and rapid gathering, collation, and dissemination of statistical and climate and crop information. The State central offices are under the systematic direction of the central office in Washington. The central office at Washington is equipped with cartographers, printers, pressmen, lithographers, and elaborate addressing and mailing appliances for the printing and mailing of large quantities of national weekly, monthly, quarterly, or annual reports and bulletins. The telegraph circuits of the Weather Bureau are ingeniously devised for the rapid collection, twice daily, of meteorological reports; they are also used to collect the weekly national crop bulletin. The Weather Bureau has 315 paid temperature and rainfall reporters who are now daily telegraphing their data from the growing fields to certain cotton, corn, and wheat centers. The Bureau has 250 storm-warning displaymen distributed among the ports along the Atlantic, Gulf, and Pacific coasts and in the Lake region. The Bureau has an observer serving each morning on the floor of each important board of trade, commercial association, or cotton or maritime exchange in the country, who displays weather and crop information and each day charts the weather reports on a large map. The Weather Bureau has 3,000 voluntary observers—nearly one for each county in the United States—equipped with standard thermometers, instrument shelters, and rain gages, who have for years intelligently served the Government by taking daily weather observations and rendering weekly crop reports to State central offices. There are 14,000 persons reporting weekly to the climate and crop centers on the effect of weather upon the crops in their respective localities. These voluntary crop correspondents could quickly be increased in number to several hundred thousand if occasion required. In one month of four weeks there are printed and distributed 168 different State crop bulletins, four national crop bulletins, and 42 monthly eight-page State climate and crop bulletins. The weekly State crop bulletins are written by the directors of the different State sections, and the weekly national crop bulletin by Mr. James Berry, Chief of the Climate and Crop Division of the Weather Bureau, a man who has had many years experience as a writer on crop conditions in the United States.

BENEFITS TO FRUIT AND SUGAR GROWERS

The utilities of the weather service are well illustrated by the benefits that the fruit interests of California derive from the rain warnings, which, on account of the peculiar topography of that region, are made with a high degree of accuracy but a few hours before the

coming of the rain, yet far enough in advance to enable the owners of vineyards, most of which are connected by telephones, to gather and stack their trays, and thus save the drying raisins from destruction. Along the Rocky Mountain plateau and the eastern slope our stations are so numerous and our system of distribution so perfect that the sweep of every cold wave is heralded to every ranch that has telegraphic communication. In the cranberry marshes of Wisconsin the flood-gates are regulated by the frost warnings of the Bureau, and where formerly a profitable crop was secured only once in several years, it is now a rare exception that damage occurs. As we go farther south and east into the Gulf and South Atlantic States, our frost warnings are made with a greater degree of accuracy than in any other part of the country. We find the growers of sugar cane in Louisiana, the truck-growers from Norfolk south to Jacksonville, and the orange-growers of Florida timing their operations by the frost warnings of the Bureau. From the estimates of these people it is indicated that the amount annually saved to them is far greater than that expended for the support of the entire Department.

FLOOD WARNINGS

No less valuable is the flood-warning service which is in operation along our large river courses. So much advance has been made in forecasting flood stages that it is now possible to foretell three to five days in advance the height of navigable rivers at a given point to within a few inches. The danger line at every city has been accurately determined and charted, so that when a flood is likely to exceed the danger limit residents of low districts and merchants having goods stored in cellars are notified to move their property out of reach of the rising waters. An illustration of the efficiency of this system was shown during the great flood of 1897. Throughout nearly the whole area that was submerged the warning bulletins preceded the flood by several days, and the statisticians of the Government estimate that $15,000,000 worth of live stock and movable property was removed to high ground as the result of the forewarnings. These warnings are distributed from fifteen river centers, at each of which a trained forecaster is located who daily is in possession of such measurements of precipitation on watersheds and such up-river water stages as are necessary to enable him to make an intelligent prediction for his own district. On account of the recent disasters from floods in the rivers of Texas steps are now being taken to establish a flood-warning service specially for that State.

Measurements of snowfall in the high mountain ridges of Montana, Wyoming, Idaho, Utah, Arizona, and New Mexico during the past several years have given us information that now enables us to make a very accurate estimate in the spring as to the supply of water from this source that can be expected during the growing season. In this way the weather service has been brought into close contact with those interested in irrigation, becoming a valuable aid to them.

The heavy responsibility that rests upon the Weather Bureau in the making of storm warnings is gathered from the statement that 5,628 transatlantic steamers and 5,842 transatlantic sailing craft enter and leave ports on the Atlantic seaboard during a single year. The value of their cargoes is more than $1,500,000,000. Our coastwise traffic is also enormous. In one year more than 17,000 sailing vessels and 4,000 steamers enter and leave port between Maine and Florida. Their cargoes are estimated to be worth $7,000,000. From these facts one can readily measure the value of the marine property that the Department of Agriculture, through the

Weather Bureau, aims to protect by giving warning of approaching storms.

The climatology of each State is now so well determined and the information is so systematically collated as to be drawn upon daily by thousands of those engaged in public enterprises, such as the building of water works, where it is essential to know the precipitation on given watersheds; the building of culverts, where the extremes of rainfall within short periods must be known; the building of great iron or steel structures, where the expansion and contraction of metal with changes of temperature must be accounted for; the speculation in land in regions that are not known to the purchaser, and the selection of residences for health and pleasure.

It is not generally known that the meteorological records daily appear in numerous of the courts of the land, and that many important cases at law are settled or greatly influenced by them.

Under the direction of Secretary Wilson, we have recently arranged with Europe and the Azore Islands for the receipt of meteorological reports that, in connection with our present extensive system, enable us to forecast wind direction and wind force for transatlantic steamers for a period of three days out from each continent. This is an extension of the meteorological service that has long been sought by mariners. The new German cable from Lisbon to New York enables us to get direct communication with several islands, the reports from which are necessary in the taking up of this new and important work.

Recently the Post Office Department, through its rural mail delivery, has placed at the disposal of the Weather Service one of the most efficient means of bringing its daily forecasts, frost and cold-wave warnings to the very doors of those who can make the most profitable use of them. The latest forecast of the weather is printed on small slips of paper, and each carrier is given a number equal to the number of houses on his rural route. Thus does the meteorological service insinuate itself into every avenue that promises efficient dissemination of its reports. To be forewarned is to be forearmed. The last appropriation for the support of the Weather Bureau was $1,058,320. It is the opinion of many insurance and other experts that the meteorological service of the United States Government is worth over $20,000,000 annually to the agriculture, the commerce, and the industry of the country, and this notwithstanding the large element of error that must for a long time to come enter into its predictions.

It may be asked what are the prospects for an improvement in the accuracy of the weather forecasts during the coming century. To this it may be answered that when our extensive system of daily observations has been continued for another generation or two a Kepler or a Newton may discover such fundamental principles underlying weather changes as will make it possible to foretell the character of coming seasons. If this discovery be ever made it will doubtless be accomplished as the result of a comprehensive study of meteorological data of long periods covering some great area like the United States. While we cannot make such prediction today, we feel that we are laying the foundation of a system that will adorn the civilization of future generations. At the present time I know of no scientific man who essays to make long-range predictions, and in closing this paper I would especially caution the public against the imposture of charlatans and astrologists who simply prey upon the credulity of the people. I believe it to be impossible for any one to make a forecast based upon any principles of physics or upon any empiric rule in meteorolgy for weeks

and months in advance. The Weather Bureau takes the public into confidence in this matter, and does not claim to be able to do more than it is possible to accomplish.

It is to be regretted that the American press, the ablest and the most heroically honest of any in the world, does in many cases not only print the twaddle of long-range weather forecasting frauds, but actually pays for the privilege. A large number of our rural press is imposed upon by these forecasts, and in publishing them become the disseminators of gross error instead of enlightenment.

WORK OF THE BUREAU OF AMERICAN ETHNOLOGY*

BY W J MCGEE, ETHNOLOGIST IN CHARGE

THE Bureau of American Ethnology was created to make scientific researches among the American aborigines. The work is conducted under the direction of the Smithsonian Institution, but the Bureau is maintained wholly through appropriations by the United States Government.

The office was instituted in 1879, primarily for the purpose of classifying the native tribes in such manner as to guide Federal and State officers in grouping them on reservations; and accordingly the earlier researches were confined to the territory of the United States. As the work progressed, it was found necessary to investigate the relations between the tribes of this territory and those of neighboring countries; and soon after the institution of the Bureau the inquiries were extended over the entire continent, and the appropriations were made for continuing researches in "North American Ethnology." Still later it was found that the ethnologic problems of North America are inseparable from those of the Antilles and South America; and about 1895 the field of research was still further extended, and the appropriations are now made for "American Ethnology." Accordingly the present field of the Bureau may be defined as the Western Hemisphere.

The special researches among the aboriginal tribes are necessarily confined largely to districts still occupied by the tribesmen (though attention is constantly given to aboriginal relics and works in districts now occupied by whites); and the extent of the operations is limited by the annual appropriations. During the past three years field work has been conducted in about one-third of the Federal States and Territories, while regular or special collaborators have operated in New Brunswick, Nova Scotia, British Columbia, along the Alaskan frontier, and on the western coast of Greenland, as well as in several Mexican and Central American States—Argentina and Chile. The work is seldom of such character as to involve surveying or original mapping; but extensive ethnologic collections are made, partly to facilitate research and partly to illustrate its results. The collections are preserved in the United States National Museum.

Designed primarily to develop a practical classification of the native tribes, the

*Reprinted from "Verhandlungen Des VII. Internationalen Geographen-Kongresses in Berlin," 1899.

earlier studies were necessarily devoted to tribal characteristics rather than racial features; and as the studies proceeded these characteristics were analyzed and defined in such manner as to yield a comprehensive tribal classification on a new basis. In its essential features the classification is, in the first place, dynamic in that it rests on the activities of men rather than on organic forms and structures; in the second place, it is demotic in that it rests on collective attributes (or on attributes of men considered as constituents of tribes or other assemblages) rather than on merely biotic structures and functions. In other words, the pressing need for a practical classification of the American aborigines compelled the abandonment of the taxonomy borrowed from biology, and led to the development of a distinctively anthropologic classification, the units of which are human groups.

The recognition of the activities as essential characteristics of tribes and peoples leads to analysis of the activities displayed by individuals and groups; and, with the advance of knowledge up to the present writing, the activities have been arranged in categories which seem to be natural and convenient: (1) the simplest activities are in large part initially spontaneous expressions of hereditary faculty, and may be classed as esthetic; (2) next follow the activities reflecting the interrelations between the individual and group (*somatikos* and *demos*) and their environment, which may be classed as industrial; (3) then follow the activities and superorganic (or institutional) structures reflecting the interrelations among individuals and groups, which may be classed as social; (4) the simpler activities, which are measurably shared by lower organisms, give shape to a series of distinctively human activities, constantly exercised in maintaining and extending demotic relation, which may be classed as linguistic; and (5) the several activities of lower order produce a series expressing the sum of human interrelations (comprising knowledge and pseudo-knowledge in all aspects), which may be classed as sophiologic. The work of the Bureau is organized on lines defined by these normal categories of activities—*i. e.*, the researches pertain to (1) Esthetology, (2) Technology, (3) Sociology, (4) Philology, and (5) Sophiology, respectively. It is held that this classification of anthropology places the Science of Man on the high plane occupied by other sciences in their modern or dynamic aspects—*i. e.*, in those aspects in which action and sequence are conspicuous and characteristic.

Definition of the activities renders it possible to classify tribes and peoples in terms of activital condition or culture, and eventually to trace the course of human development. The culture grades may be expressed vaguely in terms of esthetic development, a little more clearly in terms of industrial development, or much more definitely in terms of institutional development; and a practical seriation of the course of human development has been based on the researches among the American aborigines and other known peoples. The stages are (1) savagery, characterized by consanguineal organization through the maternal line, (2) barbarism, characterized by consanguineal organization through the paternal line, (3) civilization, characterized by organization on a territorial basis, and (4) enlightenment, characterized by organization on a basis of intellectual rights. The culture grades might be expressed still more trenchantly in terms of linguistic development, and most trenchantly of all in terms of sophiologic development, were the data sufficient; and indeed the practical classification of the aboriginal tribes of America rests on the linguistic basis. The linguistic activities were adopted as criteria for the classification, partly because of the persistence and exoteric character (and hence the ready obtainability) of language, partly be-

cause language is the key to all other activities; and the wisdom of the choice was soon demonstrated by practical application of the classification—for it was found that tribes speaking related languages were so nearly alike in arts, industries, social organization, and belief as to live together in harmony, while, if their languages were unlike, their other activities, especially their beliefs, were so incongruous as to prevent harmonious association.

Under the linguistic classification, the aborigines of America north of northern-central Mexico were classified, early in the present decade, in about seven hundred and sixty tribes, grouped in sixty stocks; and the later researches have served to establish and somewhat to extend this classification.

The discrimination of the tribes and the linguistic stocks to which they may be assigned has afforded means for tracing the history and elucidating the movements of the aborigines with considerable success; and this phase of the work has received especial attention during the last two years. The most instructive example is afforded by the tribes of the Siouan stocks: Gathering on the southern Atlantic coast probably three to five centuries before Columbus, the parent tribes drifted northward along the coast, and spread slowly inland; leaving the main coast along the middle Atlantic estuaries, they followed Chesapeake and other bays into the interior, gradually abandoning piscatory habits, and developing agriculture in connection with the chase; the inland invasion brought them in contact with the buffalo, and a considerable part of the people followed this easy game westward across the Appalachian mountains, and down the westward-flowing rivers to the Mississippi, whence they spread still farther westward, becoming the buffalo Indians par excellence of the northern plains. Meantime they increased, both by normal growth and by the absorption of weaker tribes and tribal remnants; they spread over an area several of hundred thousand square miles, and developed a number of tribal federations, the most noted being the Dakota confederacy of six or seven great tribes. Quite similar appears to have been the growth of the Algonquian-speaking peoples, who occupied the Atlantic coast north of the Siouan tribes, and pushed inland along various rivers from the Susquehanna to the St. Lawrence, and drifted thence westward along the Great Lakes and over the plains adjacent, displacing or absorbing alien tribes, and forming various confederacies as they spread over the vast interior territory. Similar, too, save in extent of migration, was the growth of the Iroquois confederacy which, within the period of three to five centuries terminated by white settlement, pursued a career of assimilation in which they extended territorial holding, absorbed a large but unknown number of inimical tribes, pressed hard against neighboring Siouan and Algonquian peoples, and developed one of the best organized and best known of the native American confederacies, the famous Iroquois League. These examples illustrate the demotic development and geographic history of the aborigines of eastern America; a growth and history which may be summed in the statement that the greater peoples represented by the principal linguistic stocks appear to have originated on the coast and spread inland, acquiring a crude agriculture, creating elaborate social institutions, and developing intelligence to a degree corresponding to the esthetic and industrial and social growth.

Quite different are the conditions on the Pacific coast, where nine-tenths of the aboriginal linguistic stocks are concentrated in one-tenth of the area; here the peoples are subsedentary (or limited in range), generally of restricted social organization, and of specialized or localized industries and arts, while the intelligence is of correspondingly

low order. When the Pacific coast aborigines are compared with those of the Atlantic coast and the interior, they are found notably more primitive in activital development; their activities were autochthonal and narrow, while those of their eastern contemporaries were broadly provincial; and in most other respects they occupied a far lower cultural plane than that of the vigorous Algonquian and Iroquoian and Siouan peoples of the eastern plains and shores. It is significant, too, that the prehistoric relics of the Atlantic coast are much more abundant and seem to attest a longer and more varied occupancy than the corresponding relics of the Pacific belt. Briefly, the researches concerning movements of tribes and peoples show that the American aborigines cannot be treated as a unit in the study of migrations, or of the peopling of the various parts of the continent; at the same time they have thrown much light on the actual lines of development and movement of the aborigines during the centuries preceding the discovery by Columbus.

The definition of the culture stages and the recognition of the lines of growth and migration of tribes and confederacies throws some light on the question as to the origin of the aborigines, and removes the inquiry from the domain of pure speculation. Summarily it may be noted, first, that the various lines of activital development are convergent, and, second, that the history of every known tribe or confederacy is a record of interclan or intertribal blending and union. Accordingly, the course of aboriginal development in America during prehistoric times can be pictured only by a series of convergent and interblending lines, coming up from a large but unknown number of original sources scattered along the various coasts of the continent.

It has not yet been found possible to reduce the period of aboriginal occupancy of the Western Hemisphere either to the accepted units of chronology or to the time-scale of geology. Various observers have reported human relics from different geologic deposits ranging in age from Miocene to late Pleistocene; but the more critical researches of the Bureau (conducted partly in coöperation with the United States Geological Survey) have shown that the evidence of association is manifestly erroneous in nearly all cases, and inconclusive in all. The latest special researches relating to the antiquity of man were conducted in the autumn of 1898, in the gold belt and Table-mountain zone of California, whence various human relics have been reported from Tertiary formations; the inquiries only served to reveal the various sources of error by which the original observers were not unnaturally misled. The chronologic inquiries indicate occupancy of various districts several centuries before the coming of white men, but there is nothing to indicate, with any strong degree of probability, an occupancy of more than fifty or sixty centuries—the body of phenomena indicating a much briefer period of habitation than that attested by the more abundant and varied relics of the Eurasian continent. In brief, there is no unmistakable indication of human occupancy of the Western Hemisphere during any of the geologic periods as commonly defined, nor more than a very few millenniums before the landing of Columbus.

During the year (1898) the collaborators of the Bureau of American Ethnology, with several other American anthropologists, have found it convenient to apply a distinctive term to the aborigines of the American hemisphere, viz., *Amerind*. The term is susceptible of use in different grammatic forms, and does not involve confusion with the modern population of Caucasian derivation. It is applied collectively to the several aboriginal tribes and tribesmen of the American hemisphere, including the Eskimo.

BOUNDARIES OF TERRITORIAL ACQUISITIONS

THE Report of "a conference upon the boundaries of the successive acquisitions of territory by the United States" has been published by the Census Bureau.* The conference was appointed, at the request of the Census Office, as an advisory committee, in the hope that certain discrepancies between different branches of the Government might be harmonized. The main conclusions of the conference are summarized by the chairman, Walter F. Wilcox, as follows:

"1. The region between the Mississippi River and Lakes Maurepas and Pontchartrain to the west and the Perdido River to the east should not be assigned either to the Louisiana Purchase or to the Florida Purchase, but marked with a legend indicating that title to it between 1803 and 1819 was in dispute.

"2. The line between the Mississippi River and the Lake of the Woods, separating the territory of the United States prior to 1803 from the Louisiana Purchase, should be drawn from the most northwestern point of the Lake of the Woods to the nearest point on the Mississippi River, in Lake Bemidji.

"3. The western boundary of the Louisiana Purchase between 49° and 42° north followed the watershed of the Rocky Mountains; thence it ran east along the parallel of 42° north to a point due north of the source of the Arkansas River, and thence south to that source.

"4. The northwestern boundary of Texas as annexed extended up the principal stream of the Rio Grande to its source and thence due north to the parallel of 42° north.

"5. The southern boundary of the Mexican Cession of 1848 should be drawn from a point on the Rio Grande eight miles north of Paso, instead of from one about 30 miles farther north, as is the usual practice at present, west three degrees, and thence north to the first branch of the Gila River."

The conference report was signed by Walter F. Wilcox, representing the Census Office; Andrew H. Allen, representing the Department of State; O. H. Tittmann, representing the Coast and Geodetic Survey; Henry Gannett, representing the Geological Survey, and P. Lee Phillips, representing the Library of Congress. The findings of the conference have no official standing, but are entitled to great weight, owing to the distinguished names signing the report.

The territorial acquisitions concerning the boundaries of which discrepancies had been noted were considered by the conference in chronological order.

THE LOUISIANA PURCHASE

The Louisiana Purchase was thus first considered, and the situation discovered was, briefly, that the territory came into the possession of the United States through the Treaty of 1803 with France, having the same extent as when ceded by France to Spain in 1763, and as when retroceded to France by Spain by the Treaty of San Ildefonso, of October 1, 1800. To ascertain the extent of this territory eastward, the conference examined the several well-known authorities upon the early history of Louisiana—Marbois, Ellicott, Gayarré, Darby, Stoddard, and others; the treaties involved; letters of Monroe, Jefferson, and Talleyrand; certain maps; the text of the grant to Crozat by Louis XIV, in 1712; the presentation of the case by the Commissioner of the General Land Office in his volume entitled "The Louisiana Purchase;" etc. This examina-

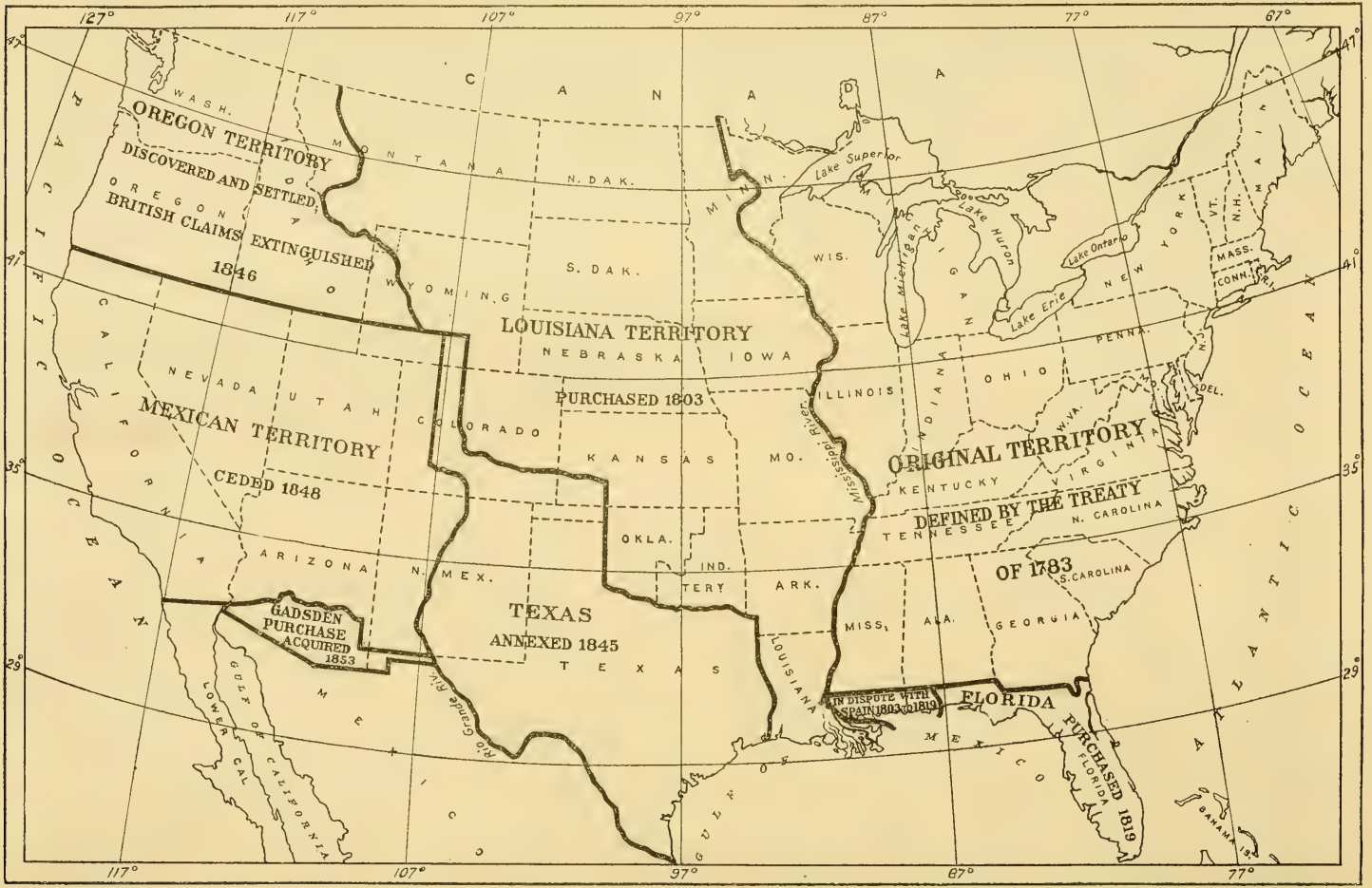
* Census Bulletin No. 74.

tion failed, however, to enable the conference to determine the dispute about the territory between the Mississippi and Perdido Rivers, claimed alike by Spain and France, and afterwards by the United States, and finally released by Spain in the Treaty of 1819, in language assigning no limits to West Florida. The conference concluded that the boundary line of this territory at the Mississippi River, as claimed by Spain, should be so defined by a legend on the map, and that the boundary line at the Perdido River, as claimed by the United States, should be similarly indicated. This conclusion was reached with an understanding or admission of the following facts touching the territory between the two rivers claimed by Spain as a part of West Florida: That the territory of Louisiana, as described by France and granted to Crozat by Louis XIV, extended on the east to the River Mobile, which, with the port, was ceded specifically by France to England by the Treaty of Paris in 1763, Spain at the same time ceding the Floridas to Great Britain, with St. Augustine and the bay of Pensacola—thus, inferentially at least, determining the respective boundaries of Louisiana and West Florida; that the first occupation of the interior of the territory between the Rivers Mississippi and Perdido by the Spaniards was during the war of the American Revolution, when it belonged to Great Britain; that Great Britain retroceded the Floridas to Spain in 1783, at which time the Louisiana territory belonged to Spain by the French cession in the preliminaries of peace of 1762 (confirmed in 1763), whereby "all the country known under the name of Louisiana" was transferred; that Spain in 1800 retroceded Louisiana to France as it was received from France in 1763; that France in 1803 ceded the territory of Louisiana to the United States, as discovered and held by France, ceded to Spain, and retroceded to France; and, finally, that in 1819 Spain ceded to the United States all the territory held or claimed by His Catholic Majesty under the names of East and West Florida. In addition to the grounds of dispute between France and Spain, and the United States and Spain, here shown, there was a conflicting claim concerning the extent of West Florida, born of the contention between French and Spanish discoverers and settlers in the sixteenth and seventeenth centuries; and there was also the claim of the French, by right of La Salle's descent of the Mississippi in 1682, to "all the country drained by that river."

With reference to the Louisiana boundary, there remained but one point of difference between the maps under consideration. Article II of the definitive Treaty of Peace of 1783 between the United States and Great Britain, after defining the northern boundary to the Lake of the Woods, continues as follows: " . . . Thence through the said lake to the most northwestern point thereof, and from thence on a due west course to the River Mississippi." Such a line as that described being obviously impossible, the Mississippi River being south not west of the Lake of the Woods, the line drawn by the conference was a line from the most northwestern point of that lake to the nearest point on the Mississippi. This line the conference regarded as justified by rules of international law and practice respecting vaguely described boundaries in such topographical circumstances.

THE OREGON TERRITORY

The Oregon Territory was the next subject to receive the attention of the conference. There seemed to be nothing in the history of that part of our possessions to warrant mention of the claim of Spain rather than that of Great Britain, and the final settlement of the question of sovereignty and boundaries by the Treaty of 1846, fixing the 49th parallel, "by an amicable compromise,"


OREGON TERRITORY
DISCOVERED AND SETTLED
BRITISH CLAIMS EXTINGUISHED
1846
LOUISIANA TERRITORY
PURCHASED 1803
MEXICAN TERRITORY
CEDED 1848
GADSDEN PURCHASE ACQUIRED 1853
TEXAS
ANNEXED 1845
ORIGINAL TERRITORY
DEFINED BY THE TREATY
OF 1783
IN DISPUTE WITH SPAIN 1803 TO 1819
FLORIDA
PURCHASED 1819
CANADA
WASH.
MONTANA
N. DAK.
MINN.
S. DAK.
WYOMING
NEBRASKA
IOWA
WIS.
MICH.
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
NEW YORK
VT.
N.H.
MASS.
CONN.
R.I.
PENNA.
N.J.
DEL.
MD.
OHIO
ILLINOIS
W.VA.
VIRGINIA
KENTUCKY
TENNESSEE
N. CAROLINA
S. CAROLINA
GEORGIA
MISS.
ALA.
LOUISIANA
ARK.
TERY
IND.
OKLA.
KANSAS
MO.
COLORADO
UTAH
NEVADA
ARIZONA
N. MEX.
CALIFORNIA
MEXICO
GULF OF CALIFORNIA
LOWER CAL.
Rio Grande River
Mississippi River
GULF OF MEXICO
BAHAMA IS.
PACIFIC OCEAN
ATLANTIC OCEAN
127°
117°
107°
97°
87°
77°
67°
47°
41°
35°
29°

as the northern boundary west of the Rocky Mountains, seemed to be a recognition by the United States of the importance of the British pretensions sufficient to warrant mention on the map. The Treaty of 1819 (the Florida Cession) had already served as a conclusive relinquishment by Spain of any claim in this quarter. Therefore the conference, considering these facts, together with the historical narrative of discoveries and occupations on the northwest coast of America by both Spanish and British explorers and adventurers, and the part played by traders, explorers, and settlers from the United States within the territory known under the name of Oregon in the eighteenth century, determined to place as a legend on the face of the map, to describe briefly and with historical accuracy the area in question, the following words: Oregon Territory discovered and settled; British claim extinguished, 1846.

TEXAS

Texas was next in order for discussion and determination, and the conference decided, almost without debate, that the northwestern boundary of that territory, as admitted to statehood in the Union, should be that defined on the map of the General Land Office—the line there shown coinciding closely with the line on the Disturnell "Map of the United Mexican States," 1847, filed with the Treaty of 1848 as a part of that convention.

THE FIRST MEXICAN CESSION

The southern boundary of the United States west of the Rio Grande, 1848, was determined in the same manner but with a different result, the line adopted being that indicated on the Disturnell map, according to the conference's interpretation of that chart. The facts are adequately stated by Major Emory at page 16 of his Report on the United States and Mexican Boundary Survey, volume 1, as follows:

"It is proper for me, however, before closing this chapter, to refer to a publication issued by Mr. J. R. Bartlett, one of the late commissioners on the part of the United States, which professes to give an accurate account of the affairs of the commission. It is not my purpose to review that work, and expose its errors, but simply to correct some statements affecting myself.

"Mr. Bartlett's principal achievement on the boundary was the agreement with General Conde, the Mexican commissioner, fixing the initial point on the Rio Bravo (*i. e.*, Rio Grande), in the parallel of 32° 22′, instead of a point as laid down on the treaty map, about eight miles above El Paso, which would have brought it to the parallel of 31° 52′. That agreement is no less remarkable than the adroitness and success with which Mr. Bartlett convinced the authorities at Washington of its correctness.

"The question has been so thoroughly discussed that a reproduction of it is not called for. It is sufficient to say here that it was disapproved by the astronomer and surveyor on the commission at the time, and was finally repudiated by the Government.

". . . My signature as surveyor was only required, as alleged, to perfect the official documents; the words of the order were: 'You will sign the map of the initial point agreed upon by the two commissioners.'

"By reference to the treaty it will be seen that any agreement of the kind required the action of the joint commission, and that the joint commission was to be composed not only of the two commissioners, but of the two surveyors also.

"I refused to recognize the act as that of the joint commission, and signed the map as the order directed, carefully and studiously attaching a

certificate that it was the initial point of the two commissioners; and to prevent the possibility of misconstruction, an agreement in writing was entered into with Mr. Salazar, and our signatures attested by witnesses, showing that the map was only that of the boundary agreed upon by the two commissioners, and nothing else.

"This course, while it permitted me to obey a specific order in writing from a superior, left the Government free to act, and repudiate the agreement by the two commissioners, as it subsequently did."

As the line on the Disturnell map delimiting the southern boundary of the United States under the Treaty of 1848 is identical with the northern boundary of the territory purchased in 1853, the conference next arrived at the point of considering

THE GADSDEN PURCHASE

An examination of the treaties, of the report of Major W. H. Emory, already referred to and quoted, and other evidence, together with a study of the treaty map, developed the fact that the repudiated line agreed to by one of the United States commissioners, Mr. J. R. Bartlett, and the Mexican commissioner, General Conde, seems to have been adopted by the General Land Office, though after having been run only one and one-half degrees west from the point of beginning, about 38 miles north of Paso, the survey was abandoned and the line repudiated by the Government of the United States. The line indicated by the treaty or Disturnell map begins at a point about eight miles north of Paso or El Paso, runs west three degrees on a parallel, and thence north on a meridian to the first branch of the Gila River. This line was adopted by the conference as the eastern part of the northern boundary of the Gadsden Purchase. The conclusion was reached after consideration of Mr. Bartlett's claims, Major Emory's report, the action of the Government, and the treaty map.

THE GERMAN SOUTH POLAR EXPEDITION

By Dr. Georg Kollm, Editor and Secretary of the Geographical Society at Berlin

THE object of the German Antarctic expedition is the scientific exploration of the South Polar regions, particularly on its Indo-Atlantic side.

In pursuance of this object, it left Germany on the 11th of August, 1901, and is proceeding to Three Island Harbor, Royal Sound, in the Kerguelen Islands, where a base station will be established. In December, 1901, it is expected that the expedition will be ready for its real work of exploration and will push on toward the south as far as practicable. Should land be reached, a station will be founded and maintained for a year and the ship wintered there. Whether any later attempt to push still farther south will be made is not yet determined. It will not, at all events, be undertaken unless the conditions should prove particularly favorable.

The expedition has general orders to remain until its tasks are satisfactorily executed, but in any case not to remain beyond June, 1904, at which date it must report at some harbor in communication with home. Should no news

be received of the expedition by the first of June of that year, it will be in order to consider the expediency of fitting out a relief ship.

The leader of the expedition, Dr. Erich von Drygalski, of Berlin, was appointed by His Majesty the Emperor, and has thoroughly studied the problems of South Polar regions. He has been placed in absolute control of the South Polar ship *Gauss*, its personnel and equipment. All the arrangements for the work to be carried on from the time the ship left Germany are under his direction and subject entirely to his control. Marine laws regulate the position of the ship's company toward its leader.

The expedition is an undertaking of the German Empire, and is fitted out through the Secretary of State for the Interior, Herr Dr. Graf von Posadowsky-Wehner. It sails under the Imperial Service flag, and its officers and men bear special service designations authorized from the highest quarters. It is thoroughly well equipped, both scientifically and practically, for its ($10,000) mission. In addition to the funds provided by the Empire, about 40,000 marks in small amounts have been contributed by private societies. The interest aroused in the expedition throughout the Empire has been very great, and has led to the presentation of many valuable gifts and offerings which will add much to the efficiency of the equipment.

All the members of the expedition will be paid their regular and special remuneration from the imperial funds. They are also well insured against accidents and diseases caused by the climate. Risks too great for ordinary marine insurance companies to assume are borne by the Empire.

The results of the expedition and the collections made by it will be the property of the Empire, which will assume charge of their disposal. The scientific members of the expedition will be employed in the arrangement of the collections in such manner as their usefulness on the expedition warrants. They have to address all their suggestions and desires to the leader of the expedition, who will make all further arrangements.

The personnel of the expedition, beside the leader, who will conduct the oceanographical and geodetic work, are as follows :

a. The scientific members : Prof. Dr. E. Vanhoffen, Kiel, for zoölogy and botany; Dr. H. Gazert, Munich, physician and bacteriologist; Dr. E. Philippi, Breslau, for geology and chemistry; Dr. F. Bidlingmaier, Lauffen, for earth-magnetism and meteorology.

b. The commander of the *Gauss*, a captain of the Hamburg-American line, Hans Ruser, from Hamburg, who was selected with the permission of His Majesty the Emperor.

c. The ship's officers : W. Lerche, from Stettin, first officer ; R. Vahsel, from Hanover, second officer, both from the Hamburg-American line; L. Ott, from Hochst, second officer ; A. Stehr, from Hamburg, first engineer.

d. The crew of the *Gauss*, which consists of two assistant engineers, two machinists, two boatmen, one Norwegian pilot, one cook, one steward, 6 seamen, and five stokers—in all, 20 men.

e. The personnel selected for the Kerguelen station consists of Dr. E. Werth, from Munster, as biologist ; Dr. K. Luyken, from Munich, as meteorologist, and two seamen.

The Kerguelen station is chiefly intended for magnetic and meteorological observations, which, as well as similar work conducted by the German Chief expedition, will be carried on in accordance with the international program agreed on with England. This program has been sent to all States having magnetic-meteorological stations, as well as to the stations themselves, with the request for coöperation. Many have already signified their readiness to do so.

It will also be followed at the station established by the Argentine Republic on Staten Island. Coöperation in all other sciences with the English expedition and all other expeditions to be sent out by other States has been regulated in the best manner by the division into spheres of work.

NATIONAL GEOGRAPHIC SOCIETY CALENDAR, 1901-1902

AT a meeting of the Board of Managers, held on September 28, the Lecture Committee reported an attractive provisional program for the season of 1901-1902. It provides for continuing the three classes of meetings, viz: Technical Meetings, to be held in the Assembly Hall of Cosmos Club; Popular Lectures, to be delivered in the First Congregational Church, and Afternoon Lectures, to be delivered in Columbia Theater.

A program for the earlier part of the season will be issued to members about October 10.

Subject to transposition in dates, the calendar proposed for November and December is as follows:

November 1.—Technical Meeting: Symposium on the Growth and Prospects of the Society; President Graham Bell, followed by Prof. Angelo Heilprin and others.

November 8.—Popular Meeting: Nearest Lands to the Pole; H. L. Bridgman, Vice-President, Arctic Club.

November 15.—Technical Meeting: The Lost Boundary of Texas; Marcus Baker, Cartographer U. S. Geological Survey.

November 22.—Popular Meeting: Interior Borneo; Dr. A. C. Haddon, of Oxford, England.

November 29.—Technical Meeting: Subjects to be announced later.

December 6.—Popular Meeting: A Winter in Ellesmereland; Dr. Robert Stein.

December 13.—Technical Meeting: Subjects to be announced later.

December 20.—Popular Meeting: A Half-century's Immigration; Hon. E. F. McSweeney, Assistant Commissioner of Immigration.

December 27.—Holiday vacation.

Lectures in contemplation for later Popular Meetings are: Conditions and Prospects in the Philippines, by Gen. A. W. Greely; The Trans-Siberian Railway, by Hon. Ebenezer J. Hill; Cliff-Dwellings of Mesa Verde, by Mrs. John Hays Hammond; The Appalachian Forest Reserve, by Hon. James Wilson, Secretary of Agriculture; The Chinese Problem; Sweden Today, by William Eleroy Curtis; The Nicaraguan Canal; The Great Pyramid, by Prof. W. Edwin Priest; Colombia; Pacific Cables, Actual and Proposed; The Danish Islands; Japanese Art and Literature, together with other topics rendered timely by circumstances.

The general subject for the Afternoon, or Lenten, Lectures is "Problems of the Pacific." The dates and special topics proposed are:

Wednesday, February 19.—Japan.

Wednesday, February 26.—Hawaii.

Wednesday, March 5.—Polynesia.

Wednesday, March 12.—Australia and New Zealand.

Wednesday, March 19.—Physical Features of the Great Oceanic Basin.

Wednesday, March 26.—The Pacific as a Factor in World-Growth.

GEOGRAPHIC NOTES

AGRICULTURAL EXPORTS

THE distribution of the agricultural exports of the United States for the years 1896 to 1900 are given in a recent report of Frank H. Hitchcock, Chief of the Division of Foreign Markets of the Department of Agriculture. The figures show that during the year 1900 there were twelve countries to each of which the United States exported over $10,000,000 worth of domestic farm produce. A total of $408,000,000 was purchased by the United Kingdom, while Germany bought $134,000,000 worth. The agricultural exports of the country to the United Kingdom during the year were the greatest on record, excepting those of the year 1898, when a total value of $439,000,000 was reached. In regard to Germany, the exports show an increase of about 100 per cent in the five-year period. Following the countries above named come others in the positions indicated :

The Netherlands, $52,000,000 ; these figures being exceeded only in 1899 by less than $1,000,000; France, $45,000,000; Belgium, $33,000,000, as against $31,000,000 in 1896 to France and $18,000,000 to Belgium during the same year ; Italy, $24,000,000; Canada, $21,000,000; Japan, over $15,000,000; Denmark, nearly $15,000,000; Cuba, $14,000,000, as against $4,000,000 in 1896; Spain, $10,500,000, as against a trifle less than $10,000,000 in 1896; British Africa, $10,300,000. Exports ranging in value from $5,515,000 down went to more than a dozen different countries.

The total exports of domestic farm products to Cuba, Porto Rico, Hawaii, and the Philippines in the year 1900 attained an aggregate value of over $20,000,000, an increase of some 300 per cent over the year 1896. In the case of South America, however, the total showed a decline. A very striking gain was made on the Asiatic Continent, where the exports in value rose from $5,735,000 in 1896 to $9,452,000 in 1900.

Traffic on the Suez Canal.—Only two of the nations having any commercial marine had a lower record than the United States in the amount of shipping passing through the Suez Canal last year. The United States stood twelfth on the list of nations, with only .6 of 1 per cent of the shipping passing through the canal, and the two nations below that were Turkey, with .3 of 1 per cent, and Belgium, at .1 of 1 per cent. Even nations like Japan, Italy, Spain, Denmark, and Norway exceeded our record, while Great Britain had 56.7 per cent, and Germany 15 per cent.

No News of Captain Sverdrup and the *Fram* is brought back by the Peary relief ship *Erik*. At Disco Inspector Jansen and Governor Neilson reported that in March, 1901, a steamer was seen far off the shore, in Davis Straits, heading northward, which might have been the *Fram*. Peary's failure to meet her or discover any trace of her work in his Greenland coast journeys lends color to the generally accepted theory that, finding a high northern latitude impracticable, she has attempted the upper Jones Sound and the little known lands and waters to the westward.

The Expedition sent out by the Duke of Abruzzi to search for the three lost members of his Polar expedition has returned without finding any traces of the missing men. The southern coast of Franz Josef Land having been explored without avail, the memorial to the three men arranged for by the Duke was erected on Cape Flora.

Dr. Robert Stein, who embarked at Etah in the *Windward* about the time of the sailing of the Peary party, has reported the safe arrival of that vessel at Brigus, Newfoundland.

Erratum.—Page 326, first column, line 10, instead of Gerhard "Kaufmann" read Gerhard Kremer.

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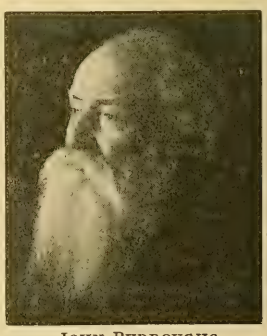

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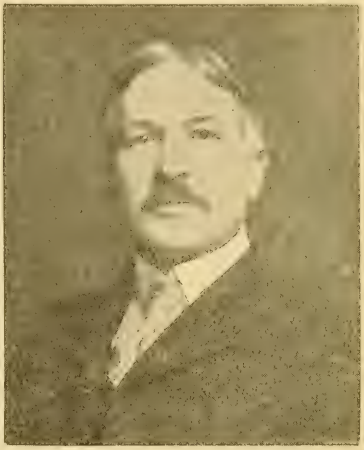

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CONTENTS

	PAGE
THE SEX, NATIVITY, AND COLOR OF THE PEOPLE OF THE UNITED STATES. ILLUSTRATED	381
A REMARKABLE SALT DEPOSIT. ILLUSTRATED	391
SVEN HEDIN'S EXPLORATIONS IN CENTRAL ASIA	393
RECENT DISCOVERIES IN EGYPT	396
KODIAK, NOT KADIAK	397
ORIGIN OF THE NAME "CAPE NOME"	398
GEOGRAPHIC NOTES	399
GEOGRAPHIC LITERATURE	409
NATIONAL GEOGRAPHIC SOCIETY	411

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VOL. XII, No. 11 WASHINGTON NOVEMBER, 1901

THE NATIONAL GEOGRAPHIC MAGAZINE

THE SEX, NATIVITY, AND COLOR OF THE PEOPLE OF THE UNITED STATES

IN June, 1900, there were in the United States proportionally a few more females than in 1890, a greater proportion of the population was native born, and there were also proportionally more whites; or, stated conversely, there were proportionally fewer males, fewer foreigners, and fewer blacks than ten years ago.

In other words, during the past ten years the number of women has been growing slightly more rapidly than the number of men; the native born population has increased at nearly double the rate of increase of the foreign born, the foreign element having increased at less than one-third of the rate of increase of the foreign born during the preceding decade, and the number of whites has increased to quite an extent more rapidly than has the number of blacks.

These are the main conclusions derived from a study of the figures presented in a recent Census Bulletin.*

The total population of the United States on June 1, 1900, was 76,303,387, including persons enumerated at military and naval stations and naval ships abroad and in Alaska, Hawaii, Indian Territory, and Indian reservations.

*Census Bulletin No. 103.

This great total consisted of 39,059,242 males and 37,244,145 females—a majority for the males of 1,815,097. Expressed differently, of each 10,000 inhabitants 5,118 were boys and men and 4,882 were girls and women. Ten years before there were 32,315,053 males and 30,754,693 females, or of every 10,000 inhabitants 5,124 were males and 4,876 were females. The females have thus increased only a very little more rapidly than the males. In 1900, in 10,000 inhabitants there were 236 more men than women, whereas in 1890, in the same number of inhabitants, there were 248 more men than women. Expressed in percentages, there has been an increase in males of 20.9 per cent and in females of 21.1 per cent.

Of native born persons there were 65,843,302 and of foreign born 10,460,085 in 1900—that is, of every 1,000 persons in 1900, 863 were born in the United States and only 137 outside the borders of the country. In 1890, on the other hand, there were 53,761,665 native born and 9,308,091 foreign born, or of every 1,000 persons 852 were native and 148 foreign born.

During the ten years the native born increased at nearly double the rate of in-

crease of the foreign born, the former increasing 22.5 per cent and the latter only 12.4 per cent. If we exclude the foreign born counted in Hawaii, Alaska, and at military and naval stations abroad, in the United States itself the foreign element increased by only 1,091,729, or 11.8 per cent, whereas during the preceding decade it increased by 2,569,604, or 38.5 per cent—that is, during the last ten years the foreign element increased at less than one-third of its rate of increase during the preceding decade. In absolute numbers there was an addition to our native born population of 12,081,637, and to our foreign born of 1,151,994.

There are 1 Japanese, 2 Chinese, 3 Indians, 116 negroes, and 878 whites in every 1,000 of the population. It should be noted that every person of negro descent is included among the negroes. The totals of the different classes are 66,990,802 white persons, 8,840,789 persons of negro descent, 119,050 Chinese, 85,986 Japanese, and 266,760 Indians, or a total colored element of 9,312,585 persons.

The negro element thus constitutes 11.6 per cent of the total population, a slightly less percentage than in 1890, when it formed 11.9 per cent. It has not, however, been increasing so rapidly as the white population, showing an increase of only 18.1 per cent as against an increase of 21.4 per cent for the whites. The absolute increase of the whites has been 11,824,618 during the ten years, and of the negroes 1,352,001.

The different elements of which the population is composed and their respective rates of increase are clearly summarized in the following table taken from the report:

POPULATION OF THE UNITED STATES BY SEX, GENERAL NATIVITY, AND COLOR: 1890 AND 1900.

Sex, general nativity, and color.	Aggregates.		Per cent of total population.		Increase from 1890 to 1900.	
	1900.	1890.	1900.	1890.	Number.	Per cent.
Total population	76,303,387	63,069,756	100.0	100.0	13,233,631	21.0
Males	39,059,242	32,315,063	51.2	51.2	6,744,179	20.9
Females	37,244,145	30,754,693	48.8	48.8	6,489,452	21.1
Native-born	65,843,302	53,761,665	86.3	85.2	12,081,637	22.5
Foreign-born	10,460,085	9,308,091	13.7	14.8	1,151,994	12.4
White	66,990,802	55,166,184	87.8	87.5	11,824,618	21.4
Colored	9,312,585	7,903,572	12.2	12.5	1,409,013	17.8
Native white	56,740,739	46,030,105	74.4	73.0	10,710,634	23.3
Native parents	41,053,417	34,514,450	53.8	54.7	6,538,967	18.9
Foreign parents	15,687,322	11,515,655	20.6	18.3	4,171,667	36.2
Foreign white	10,250,063	9,136,079	13.4	14.5	1,113,984	12.2
Negro	8,840,789	7,488,788	11.6	11.9	1,352,001	18.1
Chinese	119,050	126,778	0.2	0.2	*7,728	*6.1
Japanese	85,986	14,399	0.1	(†)	71,587	497.2
Indian	266,760	273,607	0.3	0.4	*6,847	*2.5

* Decrease.

† Less than one-tenth of 1 per cent.

THE FOREIGN ELEMENT

In the preceding paragraphs the increase in the foreign born in the United States as a whole has been discussed, but it is interesting to inquire further into the nature of the increase. In what sections and states is the increase concentrated, how does the nationality of the immigrants of the past decade compare with the nationality of the immigrants of the preceding decade, and what is the present distribution throughout the country of our foreign born inhabitants?

Four-fifths of the increase in the number of foreigners in the United States during the past decade are found in the states constituting the North Atlantic division. Of the total increase of 1,091,729, as large a proportion as 874,619 occur in this section, while the increase in the South Atlantic division is only 7,505; in the North Central division, 98,360; in the South Central division, 35,834, and in the Western division, 75,411.

Thus of every thousand increase of foreign born 801 are concentrated in the six New England States and in New York, New Jersey, and Pennsylvania. During the preceding decade, however, the largest share in the increase of our foreign born was found in the states constituting the North Central division—Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, the Dakotas, Nebraska, and Kansas. These states then showed 44.5 per cent and the North Atlantic states 41.8 per cent of the increase in foreign born during the ten years.

In every section of the country the percentage of increase of the foreign born for the decade has greatly diminished. Even in the North Atlantic division there has been a considerable loss in this respect, the percentage of increase for the foreign born for the ten years being only 22.5 per cent as against 38.5 per cent for the preceding decade. The decrease was especially noticeable in the North Central and the Western divisions, in which the rate of increase for the foreign born fell from 39.2 and 54.2 per cent to 2.4 and 9.8 per cent respectively.

In each section also, excepting in the North Atlantic division, the rate of increase of the foreign born was less than the rate of increase of the native born. In the New England States and in New York, New Jersey, and Pennsylvania, however, the foreign born have increased a little faster than the native born—22.5 per cent as against 20.5 per cent.

THE CHANGING CHARACTER OF OUR IMMIGRATION

The remarkable change that has taken place in the character of the immigration of late years largely accounts for the recent concentration in the North Atlantic division. During 1891–1900, 3,687,564 immigrants entered the United States, one and one-half million less than in the ten years preceding. Of German immigrants during the past decade there were 505,152, whereas during the preceding ten years there were as many as 1,452,970. Norway and Sweden's contribution during 1891–1900 was 321,281 as against 568,362 during 1881–1890. The figures for Great Britain and Ireland show a similar decrease. On the other hand, Austria-Hungary, Italy, and Russia and Poland during the past decade sent over 1,846,616 immigrants, about double the number contributed by them during 1881–1890.

Thirty years ago Canada, Germany, Great Britain, Ireland, and Norway and Sweden sent 90.4 per cent of all the immigrants entering the United States, and Austria-Hungary, Italy, and Russia and Poland a scanty 1.1 per cent. In 1880 the first group were contributing 81.7 per cent and the second group 6.4 per cent; in 1890, the first, 73.9 per cent, while the second had grown to

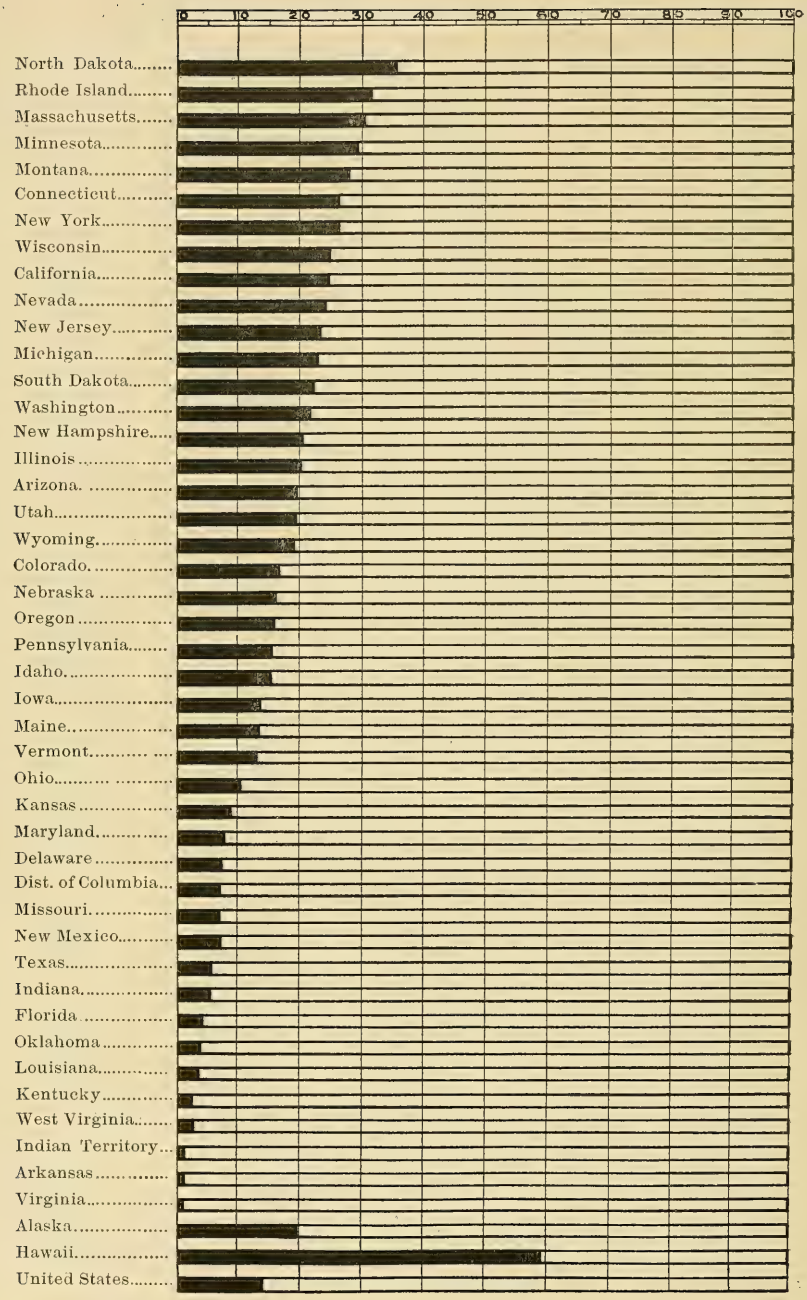


Diagram showing the Percentage of Native and Foreign Born in all States and Territories having at least One Per Cent of their Population Foreign Born

The darkened portion represents the Foreign Born

17.6 per cent. During the decade just ended the former group supplied only 40.4 per cent, while the latter furnished fully one-half, or 50.1 per cent. This new element of Poles, Italians, and Hungarians have settled in the mining districts of Pennsylvania and in the manufacturing towns of New York, New Jersey, and New England. They now form the bulk of laborers in these states, having superseded the Irish in the heavy work of digging trenches for railways or sewers and in the making and repairing of roads. No better example could be cited than the present work of digging a way for the underground system of New York City. The majority of the laborers are Italians and Poles, whereas fifteen or twenty years ago such work would have been mainly done by Irishmen.

The Census Bureau has not yet published the relative components of our foreign population, but it is interesting to note the nationalities that make up our total immigration, amounting to 19,115,221 in 80 years. Germany has contributed over one-fourth, 5,009,280; Ireland slightly more than one-fifth, 3,869,268; Great Britain one-fifth, 3,026,207; Norway and Sweden nearly one-fifteenth, 1,246,312; Canada and Newfoundland, 1,049,939; Italy, 1,040,457; Austria-Hungary, 1,027,195, and all other countries about one-tenth, 1,919,661.

Probably one-fourth of our immigrants have during the past ten years returned to their old homes. Three and one-half millions are recorded as having entered the country, but there is an increase in our foreign born population of only about one million, conclusive proof that many remain in America for only a short period.

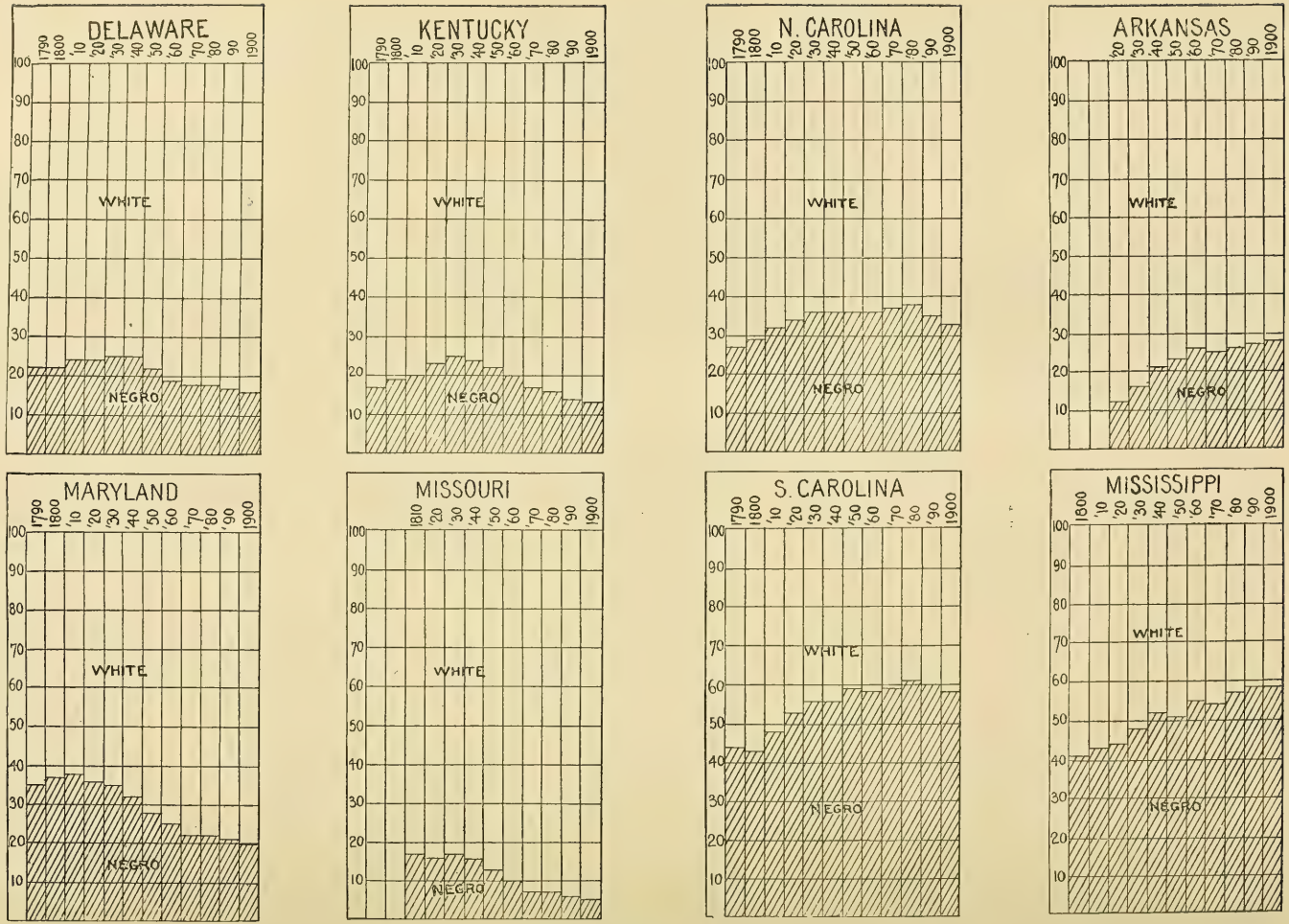
THE DISTRIBUTION OF THE FOREIGN BORN

The diagram on page 384 shows the relative percentage of foreign and native born in each state of the Union. North Dakota leads, with the largest percentage of foreign born, Rhode Island follows next, Massachusetts is third, and Minnesota fourth. These four states, together with Montana, Connecticut, and New York, are the only states that have approximately one-fourth or more of their population of foreign birth. California, Montana, and Nevada stand high up in the list because of the numerous Chinese and Japanese in these states. Six states—North Carolina, South Carolina, Mississippi, Georgia, Alabama, and Tennessee—are not included in the diagram, for each of these six states has less than 1 per cent of its population foreign born.

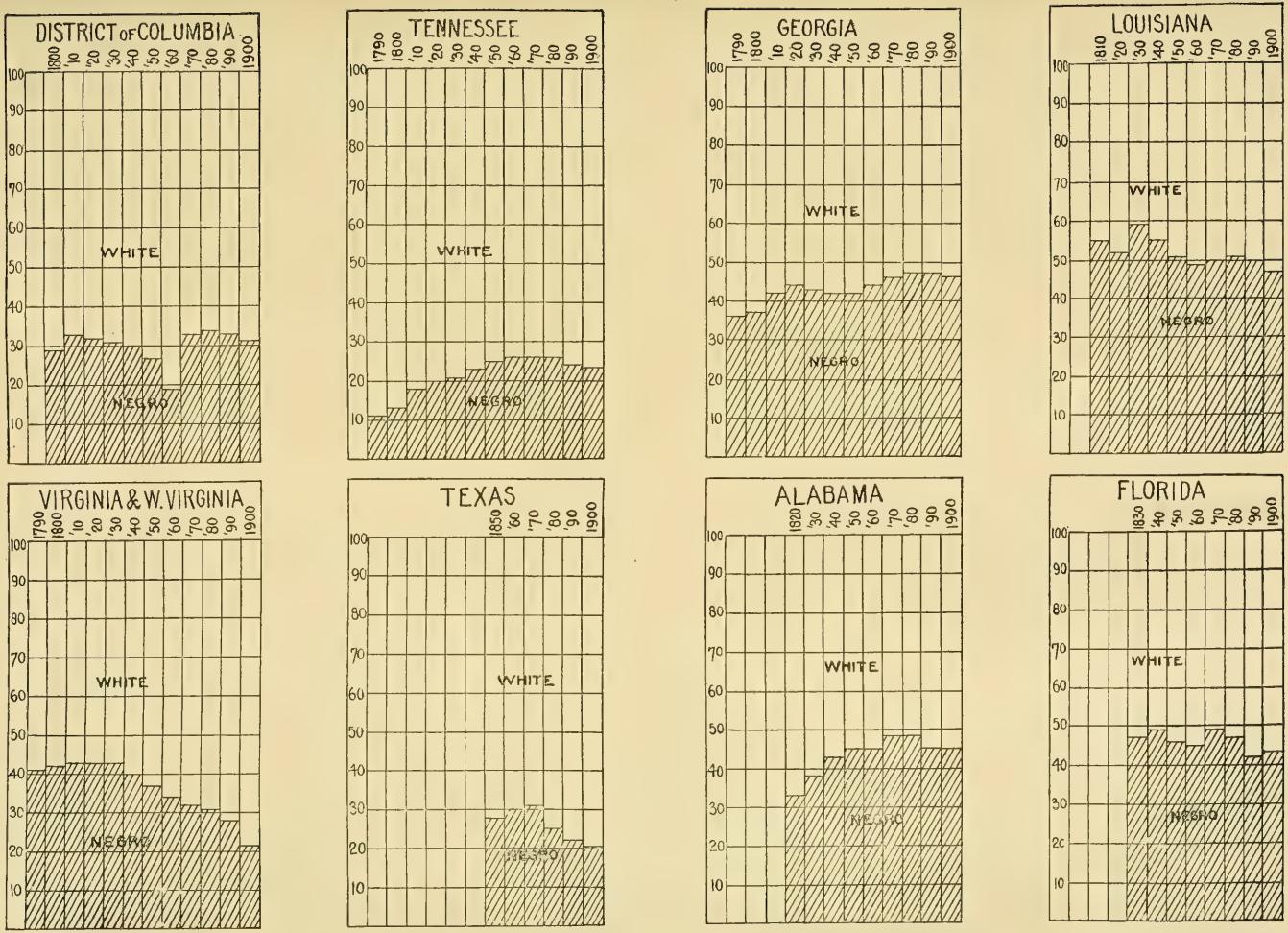
The states comprising the North Atlantic division have the largest percentage of foreign born, there being in this division 226 foreigners to 774 native-born. As has been previously noted, these are also the only states in which the foreign born have increased more rapidly than the native born during the last decade.

A natural result of the great immigration period of 1881–1890, when over half a million immigrants entered the United States annually, would be a large increase during the succeeding decade in the number of persons born in the country of foreign parents. Such, in fact, proves to be the case. In the last ten years the native whites of foreign parents have increased at the rate of 36.2 per cent, which is nearly double the rate of increase of native whites of native parentage, 18.9 per cent. For the most part, these sons and daughters born on American soil of foreign parents grow up as thoroughly American in thought and act as the descendants of the earliest settlers.

If we include in the foreign element the children of foreign white parents, the foreign element now constitutes about one-third of the total population—34 per cent. The native whites of native par-



Percentage of Whites and Negroes in Certain States at Each Census: 1790-1900



Percentage of Whites and Negroes in Certain States at Each Census: 1790–1900

entage constitute slightly more than one-half—53.8 per cent.

THE NEGRO ELEMENT

In the United States as a whole the negro element has increased since 1890 18.1 per cent, whereas the white element has increased as much as 21.4 per cent. The more rapid increase of the white is true also of the South Atlantic and South Central divisions, where nearly nine-tenths of the negro population are concentrated. The only Southern states in which the persons of negro descent have increased more rapidly than the whites are Florida, Alabama, Mississippi, Arkansas, West Virginia, and Oklahoma. The negro element, however, forms such a small percentage of the population of the two latter states (4.5 and 7.7 per cent respectively) that they may be practically disregarded.

The more rapid increase of the white element is not due to an influx of whites from other states, as is shown by a comparison of the increase of the native whites of native parentage with the increase in persons of negro descent. In the South Atlantic division persons of negro descent have increased 14.3 per cent and native whites of native parentage 20.5 per cent. In the South Central division the former have increased 19.9 per cent and the latter 29.2 per cent.

The diagrams on pages 386 and 387 show the percentage of the negro element in the various southern states at each census period since 1790.* South Carolina and Mississippi are the only states in which the negro element is now in the majority. Ten years ago the whites were in the minority in Louisiana, but they have since increased in this state twice as fast as the negroes. In Kentucky they have increased three times as fast, and in Texas one and one-half times as fast as the negroes.

THE CHINESE, JAPANESE, AND INDIANS

There has been a considerable decrease in the number of Chinese in the United States during the past decade. In the United States proper the number fell from 107,488 to 89,863, a loss of 17,625, or 16.4 per cent. The Chinese are now more widely distributed throughout the country. In all the divisions excepting the Western division there are more Chinese than there were ten years ago. The state of California has lost over 26,000, but Oregon and Washington have gained a small number. In Hawaii there are 25,767 Chinese. The following table shows the distribution of the Chinese in the United States proper:

Geographical divisions.	No. of Chinese.	
	1900.	1890.
Total	89,863	107,488
North Atlantic division	14,693	6,177
South Atlantic division	1,791	669
North Central division	3,668	2,351
South Central division	1,982	1,447
Western division	67,729	96,844

The number of Japanese in the United States proper has increased more than ten fold since 1890. Ten years ago there were only 2,039 Japanese in the country, whereas at the time of the last census they numbered 24,326. As might naturally be expected, a very large proportion, amounting to 96.1 per cent, are concentrated in the Western division. The Japanese element in Hawaii has increased five fold, and now amounts to 61,111, about one-third of the total population of the islands. The distribution of the Japanese in the United

* The diagrams showing the percentage of whites and negroes in certain states at each census are based on similar diagrams in *Statistical Atlas of the United States*, Eleventh Census, by Henry Gannett, p. 18.

States proper is given in the following table :

Geographical divisions.	No. of Japanese.	
	1900.	1890.
Total	24,326	2,039
North Atlantic division	535	247
South Atlantic division	29	55
North Central division	349	117
South Central division	37	61
Western division	23,376	1,559

The Indians also have decreased during the decade, but not nearly as rapidly as has been commonly supposed. There are 6,847 less than in 1890, a loss of only 2.5 per cent. About one half of these Indians are taxed. The census shows an increase in the number of Indians in Alaska of 4,182, but probably the increased figures are because of the more careful enumeration that was possible. The number of Indians in the United States, exclusive of Alaska, is now somewhat less than a quarter of a million—237,196 as against 248,253 in 1890. In Alaska itself there are 29,536 Indians.

DISTRIBUTION OF MALES AND FEMALES

The number of men and women throughout the United States was more evenly balanced in 1900 than ten years before. Each of the states of the Western division shows a larger proportion of females and a smaller proportion of males than in 1890. On the other hand, in the North Atlantic and South Atlantic divisions, considered as a whole, where ten years ago there was a slightly larger proportion of females, there was in 1900 an equal proportion of both sexes. There are eleven states, including the District of Columbia, in which there are more females than males. Each of these states is situated on the Atlantic coast.

Massachusetts has the largest majority of females, having 70,398 more women than men. New York has a female majority of 39,334 ;* the District of Columbia, 14,710; North Carolina, 16,456 ; South Carolina, 10,526, and Georgia, 9,929. Maine, Vermont, and Connecticut have a majority of the male sex. In Pennsylvania there are 106,967 more males, due principally to the large element of the foreign-born working in the mining districts. In all the states of the North Central, South Central, and Western divisions there is a majority of the males. The largest excess of males is in Montana, Wyoming, and Nevada, in which states the males constitute more than 60 per cent of the entire population.

The negro element is the only element of the population in which there are more females than males, there being 54,347 more females of negro descent than males. It is interesting to note that the native whites of native parents have the largest proportion of males to females—51 per cent males and 49 per cent females. The native whites of foreign parents are very evenly balanced as to sex. Naturally there is a large excess of males in the foreign-born element, while six sevenths of the Chinese and two thirds of the Japanese are males.

G. H. G.

* The excess in this State is confined to native whites of native and foreign parentage, the foreign whites, Chinese, Japanese, and Indians showing an excess of males.

Plowing up the Salt in the Sea of Salton

A REMARKABLE SALT DEPOSIT*

By Charles F. Holder

THE deposit of salt at Salton is one of the sights of California. It lies in a depression almost 300 feet below the sea-level, and was at some time in the past the bed of the sea or extension of the Gulf of California.† From the train, which passes near by, the tract looks like a vast snow field, and in the early morning is frequently the scene of beautiful mirage effects. The salt deposit, which is essentially rock-salt, covers about 1,000 acres, and is at present the center of interest on account of the dispute of rival companies over the possession of the property. The company in possession has shipped from this place annually about 2,000 tons of salt, valued at from $6 to $34 per ton. The outfit of the salt mine consists mainly of a crusher, a drying building, and a dummy line from the salt beds to the Southern Pacific Railroad, not far distant.

The work is carried on chiefly by Indians, who can withstand the intense heat of the desert—150° in June—and the glare better than white men. The work is interesting and novel. The drying house is a building 600 feet in length, about which hundreds of thousands of tons of salt are heaped, having all the appearance of snow. Here the salt is dried and milled.

The salt is collected at first with a plow—a singular machine with four wheels, in the center of which sits an Indian guiding it; the motive power is a dummy engine some distance away, which hauls the plow along by cables. As it passes, the steel breaker is seen to cut a broad but shallow furrow, eight feet wide and three feet long, throwing up the ridges on either side. Indians now follow along, and with hoes pile up the salt in pyramidal forms, which later is transported to the mill. Each plow harvests 700 tons of salt per day. A singular feature of this bed is that the salt is being deposited daily by springs which run into the basin, and as the water evaporates it leaves a crust of almost pure chloride of sodium, which ranges from 10 to 20 inches in thickness, over the lake. It will be seen that there is no danger of exhausting the supply, which is forming all the time; and, in point of fact, the plows have in the past years worked almost continuously over the same area, only about 10 acres having been plowed.

The salt, when delivered at the plant, is hoisted to the upper floor and placed in a bulkhead breaker, where it is reduced to particles of the same size. It then passes through a burr mill and is well ground After this it is sifted and is finally passed through an aspirator, which cleanses it of all foreign material, when it is ready for packing in bags. The salt is used for a variety of purposes, and is of several different grades, the lowest being unrefined—a product called hide salt, used in manufactories. Large quantities are sold for sea-bathing purposes, a certain amount producing a very similar chemical equivalent to sea water. Other grades are prepared for the table, dairy, and for the use of druggists.

† See the National Geographic Magazine, vol. xi, no. 9, p. 340 *et seq.*

* From the *Scientific American*.

Piles of Salt at Salton—280 feet below the level of the ocean

SVEN HEDIN'S EXPLORATIONS IN CENTRAL ASIA*

IT will be remembered that Dr. Hedin traveled down the Yarkand and Tarim Rivers to the Lob Nor region (1899–1900), in which he made many excursions of the greatest value to geographical science; but what delighted him most was the very important discovery he made of an ancient lake bed which strongly confirmed the theory he advanced after his first journey in Central Asia, that the ancient Lob Nor Lake was not identical with the lake which commonly bears that name at the present day. Writing from Tiumen (Temirlik), at the end of October, 1900, Dr. Hedin announced his intention of making two more journeys before he set out on the long march home, one among the mountains to the west of Temirlik, the other to the ancient lake bed he had discovered and the Kara-Koshun Lake, which he identified with Prjevalsky's Lob Nor. It is with these two expeditions that his latest letters deal.

Starting on the first journey, to the great or westerly Kum-Kul, early in November, Dr. Sven Hedin crossed and measured these mountains on three lines. He passed through absolutely unknown country, but the excursion was a comparatively short one, lasting only a month, and by December 12 he was ready for the more important march. On this he had with him nine men and eleven camels and ten horses. Khan-ambal was the first point for which he made, and this he reached by a rather difficult mountain road, lying to the south of Littledale's road, which was struck at Khan-ambal. After making a circular march to Sirting, round the magnificent Anambar-ula and back to Khan-ambal, Dr. Sven Hedin proceeded across the desert straight to the north, and passed through the mountainous region which constitutes the western continuation of the Kurruk Tagh. He was able to map the whole of his route from Temirlik, and found that the existing maps were quite incorrect.

During the latter part of the march the little company of travelers had a very trying experience. For twelve long and arduous days, during which they pushed forward as rapidly as possible and covered, in spite of the slow rate of traveling necessitated by the careful observations which Dr. Sven Hedin was continually taking, about twenty miles a day, not a drop of water was found. Fortunately, on the third day the travelers came across some snow, and this just enabled the camels to last out until water was reached; otherwise they must inevitably have succumbed. After this Dr. Hedin, with the aid of the map he had compiled in March, 1900, when he made his great discovery in connection with the Lob Nor problem, was able to find Altimishbuluk quite easily, and from there to proceed with all his caravan to the ruins on the northern shore of the ancient lake bed. The camels were heavily laden with ice, and after they had been sent back to the "bulak," Dr. Hedin was able to stay among the ruins for a week. During this time he was busily engaged compiling maps and plans, taking photographs, gathering together collections of various kinds, and making excavations among the ruins. The discoveries he made were both numerous and important, but he thinks that perhaps his most curious "find" was some twelve complete letters written on paper in Chinese. They were in a marvelous state of preservation, every sign being perfectly distinct and legible.

* From *The London Times.*

Among other curiosities that Dr. Sven Hedin will bring home are thirty little pieces of wood, which, so far as he can judge at present, must have been used as some kind of ticket. Each one has inscribed on it the name of some emperor, the year of his reign, the month, and even the very day. A "siah" who has read some of them tells Dr. Hedin that they are 800 years old, but the latter feels that he cannot form a definite opinion until he has had them translated on his return.

Among the ruins Dr. Hedin found a beautiful Buddhist temple, in which he saw some most artistic wood-carving. One of the representations was a large fish, and in this connection he mentions that one house contained a number of fish bones which were evidently the remains of fish exactly similar to those found today in the Kara-Koshun Lake to the south. These facts Dr. Sven Hedin considers important as strengthening his claim to have found a lake bed which was actually filled not so many years ago, and which is the true site of the Lob Nor of the ancients. In the temple Dr. Hedin further found a Buddha, carved in wood; and he also mentions as one of his "finds" a piece of wood which he describes as being about half the size of the sheet of notepaper he was writing on, on which there was writing in Tibetan characters. In one of the Chinese letters, to which reference has already been made, the place is called Lo-län, and there is also mention of the great road which it will be remembered Dr. Sven Hedin found running along the northern shore of the lake bed, which is said to join Lo-län to Sa-dscheo. Dr. Hedin brought away with him specimens of the various kinds of wood-carving, and students in Europe will eagerly await the sight of these as well as of the photographs of the ruins which Dr. Hedin had developed just before writing and of which he speaks in the most enthusiastic terms.

Of the full importance of his discoveries among the ruins it is, he says, impossible to give at present any adequate idea, but he states that he has gathered together materials for a bulky volume on the Lob Nor problem alone. He is particularly pleased that, on leaving the ruins, he was able to take observations which have enabled him to draw the "leveling" line between the northern shore of the ancient lake bed and the northern shore of Lake Kara-Koshun, or, in other words, to ascertain the variations in level between these two points. These observations, he is convinced, have afforded him the best argument he could possibly have to show that he has found the true solution of the Lob Nor problem. He found that the ruins on the northern shore of the ancient lake bed were situated at a level 2,272 meters higher than that of the surface of Lake Kara-Koshun, but that the lowest point of the lake bed lay about as much below the same surface. Between the lake bed and the lake the desert rises to a point somewhat higher than the ruins. Dr. Sven Hedin states that his observations will enable him to determine not only the surface dimensions of the old lake bed, but also the lines of depth. It has just been mentioned that the lower half of the ancient lake bed is lower than the surface of the Kara-Koshun Lake, and Dr. Hedin reports that the water in the latter is now finding a passage to the old basin. When Dr. Hedin was making his explorations in this part the waters of the present lake were spreading north so rapidly that it was unsafe for the travelers to camp on the shore.

At the date of the letter in which he described these interesting researches (April 23 of this year), Dr. Sven Hedin was at Chaklik, which he had reached only a few days earlier. He was greatly surprised to learn from the letters he found awaiting him about the troubles in China (he himself had been traveling

in a portion of the Chinese Empire!), and somewhat amused at the warnings addressed to him by King Oscar, the Swedish Minister for Foreign Affairs, and numerous other friends, to the effect that he should be careful not to expose himself to the cruelty of the Chinese, while he laughed at the idea that he might be compelled to leave his work unfinished and return to Europe at once.

In Chaklik, he says, though it is a town in the middle of the Celestial Empire, there are only fifteen Chinese, and these were mortally afraid of him and his Russian escort of four Cossacks. They did everything he commanded, procuring camels, horses, and provisions for him without delay and otherwise carrying out his behests with the greatest promptitude. Dr. Sven Hedin's next line of march will be through Tibet, and there, of course, as he remarks, there are no Chinese.

Looking back over his work from Chaklik, Dr. Sven Hedin is fully satisfied with the results he has obtained. He has followed a different plan of work from that which he pursued on his first expedition, in 1893–'97. Then he not only took observations and made notes, but also worked at the books he intended to publish on his return. On this expedition he has done nothing of the latter kind of work, but has left it all to be done when he reaches home. He had already, when writing, compiled 726 sheets of maps, 150 of them large sheets.

He calculates that he has more than twice the cartographical material he accumulated on his last expedition, and hopes to be able to publish it in a large atlas of some 60 or 70 maps on a scale which will permit of the details being shown. The scientific results of all his geographical, geological, and hydrographical studies he proposes to publish in two large volumes of 500 pages each, which will form a text to the atlas. Dr. Hedin has such a wealth of material to draw upon that he will find it very difficult to compress the popular narrative which he hopes to publish into two moderate volumes. He hopes, however, to do so.

As to his future plans, Dr. Hedin does not now think that he will reach Europe this year. When writing last he proposed to spend some eight or ten days at Chaklik, and then, having prepared his caravan very carefully for the last stage of his great journey, to cross Tibet diagonally from Temirlik to the sources of the Indus, passing, if possible, a little to the north of Lake Manasarowar. As he travels slowly and maps carefully, Dr. Sven Hedin expects that this march will occupy the rest of this year. If it can be arranged, he would like to visit Lord Curzon in Calcutta; then, returning to his caravan, proceed as quickly as possible to Kashgar *via* Ladak. He intended to send all his collections and unnecessary luggage — fifteen horses' load — direct to Kashgar from Chaklik. From Kashgar, Dr. Hedin does not feel that he could return direct to Europe on account of his Cossacks, who have rendered him invaluable services, and to whom he has become quite attached. These he feels bound to leave in none but a Russian town. Altogether, therefore, it will be about a year from the date of his last letters before European geographers can receive Dr. Sven Hedin with the welcome which he has so well earned.

RECENT DISCOVERIES IN EGYPT

RECENT discoveries in Egypt have carried the record of Egyptian civilization back definitely for 1,000 years and have given light to what was happening during 1,000 years more. In other words, Egyptian history has been brought to light for nearly 2,000 years before the building of the pyramids, which happened about 4000 B. C. As Prof. W. M. Flinders-Petrie, in an article in *Harper's Magazine* for October, says, "We even know what was going on in every generation for some 2,000 years before that time [building of the pyramids] far more than the later Egyptians themselves knew."

It is the discoveries of treasures of gold and ivory and beautiful stones in the royal tombs at Abydos through the persevering and efficient efforts of Prof. Flinders-Petrie and members of his party that have brought to light the history of this remote past. The oldest record of human history is the statement that ten kings reigned in Abydos, in upper Egypt, during the 350 years before Mena (4777 B. C.), who founded the united kingdom of the whole land and is counted as the first king of the first dynasty. Four of the tombs of these earliest kings were identified several years ago, as well as those of Mena and his successors, but their significance was not understood until this spring, when a large number of small objects were found in the tombs at Abydos. The most surprising discovery were four bracelets belonging to the Queen of King Zer, about 4700 B. C., some 2,000 years earlier than any other jewelry thus far identified. The bracelets were wrought with the most ingenious and delicate workmanship. Even a magnifier did not reveal the joints, so perfect was the soldering. The finest bracelet is formed of alternate plaques of gold and turquois, each surmounted with the royal hawk and paneled to imitate the front of the tomb or palace.

It seems marvelous that the jewelry had not been previously discovered. In early times the tombs were broken into and ransacked. Some plunderer had broken up the queen's body, and being disturbed in his plundering had broken off an arm of the mummy and thrust it into a crevice in the wall. Centuries later, about 1400 B. C., the tomb was cleaned out and a shrine of Osiris built in it, and for a thousand years every visitor passed within a few feet of the fragment. Two thousand years later the Copts utterly destroyed the shrine and the other royal tombs, and yet the arm lay untouched. Three years ago a French explorer carefully examined the whole space, and yet the arm remained unseen until one of Dr. Flinders-Petrie's workmen noticed it and called his attention to it. The arm was opened carefully and the bracelets revealed.

Professor Flinders-Petrie believes that during the 57 years of King Zer's reign a rapid crystallization of art took place. Before his reign everything was archaic and tentative, but afterward vigorous and perfect. He believes "this sudden fixation of the final forms is what is also seen in Greek art, where the interval of 40 years between the Persian war and the Parthenon sufficed for the step from archaic work to the highest perfection, after which all else was a gradual decay." Fragments were found of hundreds of different forms of vases cut in hard stones. In the tombs of one of the kings of the second dynasty, about 4373 B. C., were seven stone basins with gold covers, a whole dinner service in thin beaten copper, and over a hundred models of food. Another prize was a royal scepter formed of cylinders of rich red sard held together by a copper rod

in the center and bound around by seven gold rods. The handle end was lost; but this is the only ancient scepter known before that of Tarentum, 4,000 years later. Several miles to the north of Abydos were this year discovered the royal tombs of a king several centuries later, with eighteen chambers sixty feet under ground.

Thus the egyptologist has now identified the names of king after king in those ancient times which were "as old in the days of Exodus as the Exodus is in our time." As Professor Flinders-Petrie says, the historian now knows "far more about the civilization of these oldest known kings than we do about our own Saxon kings of England."

KODIAK NOT KADIAK

OFF the coast of Alaska, near Cook Inlet, is a large island which has had trouble with its name—trouble with its spelling, trouble with its pronunciation.

The spelling now adopted by the U. S. Board on Geographic Names is Kodiak (pronounced Kō′-di-ak), this being a reversal of the decision Kadiak made by the same Board about 10 years ago. The universal local usage as to this name is Kodiak. Such, also, is the general usage on the Pacific coast. It is this widely extended and firmly established usage which has led the Board to discard an alleged "correct" form and adopt an alleged "corrupt" form which local usage has firmly established.

Kodiak is a large island about 100 miles long by 50 miles wide. Its principal town (population in 1900 341) was called St. Paul by the Russians, and is now called both St. Paul and Kodiak. The post-office in this town, established in August, 1888, is called Kodiak.

The island was discovered by Stephen Glotof, a Russian fur hunter, who anchored in Alitak (Kaniat) Bay, in the southwestern part of the island, on September 8, 1763. He learned from the natives that the island was by them called Kikhtak.[1] Kíkhtŭk is the Innuit word for island.[2] Petrof says:[3]

"Kikhtak or Kikhtowik is the Innuit word for island. At the present day (1886) the natives of the peninsula speak of the Kadiak people simply as Kikhtagamutes, islanders. The tribal name appears to have been Kaniag, and the Russian appellation now in use was probably derived from both."

Martin Sauer,[4] who wrote the account of Billings' expedition, 1785–1794, says:

"Shelikof has called this island Kichtak as the original name of it, in which, however, he is mistaken, for Kichtak or Kightak is merely an island; they call the Trinity Island Kightak Sichtunak, thus, Kightak Kadiak; and to my astonishment one of them called Alaska a Kightak or island."

Cook,[5] in 1778, got the name Kodiak from the Russian Ismailof. This spelling was followed by Meares, 1788, Vancouver, 1794, and Langsdorf,[6] 1804, who has Kodiak, Kadjak, or Kuktak—*i. e.*, Great Island. The British Admiralty charts, Nos. 260, 278, 787, 2172, 2460, and 2558, followed the spelling Kodiak. Sauer,[7] about 1790, has Kadiak, and so also has Lutke,[8] 1836. Dixon, 1789, has Kodiac and Codiac; Lisianski, 1804, has Cadiack. At the time of the purchase of Alaska the form Kodiak (pronounced Kō′-dy-ak) was in general use among English-speaking people, and the same form, Kodiak (pronounced Kăd-yăk), was in general use among the Russians. Dall[9] says:

"The Russian O when not accented

should be rendered in English by A; from the neglect of this (comes) Kódiak instead of Kadiák."

Also, he says:

"Kadiăk.—The name of the largest island south of Aliáska. It is a derivative, according to some authors, from the Russian Kádia, a large tub; more probably, however, it is a corruption of Kaniág, the ancient Innuit name. The inhabitants, according to Coxe, called themselves Kaniágist or Kaniágmut. This name is almost invariably misspelled by English authors as Kodiak, Codiac, Codiack, Kadiack, and in other similarly absurd ways. The above is the only correct spelling."

The spelling of this name was submitted to the Board on Geographic Names in 1890 and the form Kadiak adopted. Local usage has, however, remained Kodiak, both in form and pronunciation, while the pronunciation Kā'-dy-ak is often heard from the lips of those who have learned the name, not from hearing it, but from the printed page. Moser, in Report of the Fish Commission (1899, p. 19), says:

"Though the present approved spelling of the name of this island is Kadiak, the company retains the former spelling Kodiak."

Martinez and Lopez de Haro, in 1788, named the island Florida Blanca.

M. B.

[1] Bancroft (H. H.) Hist. of Alaska, 1886, pp. 141, 145.
[2] Dall (W. H.) Alaska, 1870, p. 532.
[3] Bancroft's Hist., p. 224.
[4] Sauer (M.) Account of geographical expedition, etc., 1802, p. 174.
[5] Cook (J.) Voyage to Pacific Ocean, 1785, 2d. ed., vol. 2, p. 504.
[6] Langsdorf (G. H. von). Voyages and travels, 1814, vol. 2, p. 58.
[7] *Op. cit.*, pp. 168–170.
[8] Lutke (F. P.) Voyage, etc., Partie nautique, 1836, p. 268.
[9] *Op. cit.*, pp. 529 and 532.

ORIGIN OF THE NAME "CAPE NOME"

DURING the last four years I have had numerous inquiries concerning the origin of the name *Cape Nome*, on the northwest coast of Norton Sound, Alaska. I searched every available chart and narrative of that region to trace it home.

I traced it back to Admiralty Chart No. 2172, of 1853, as being the earliest to use the name. It is not in the Great Atlas of Tebénkof of 1848–'52, devoted to the North Pacific.

I looked up the tracks of the Sir John Franklin rescue ships, H. M. frigate *Herald* and brig *Plover* (1845–'51), and became satisfied the name was given in the cruises of one or other of those vessels.

A short time since I wrote to the chief hydrographer of the Admiralty and asked if the name *Nome* appeared among the lists of officers of the *Herald* and *Plover*.

Today I have a letter from the hydrographer of the Admiralty, dated London, August 9, which contains this statement:

"When the MS. chart of this region was being constructed on board H. M. S. *Herald*, attention was drawn to the fact that this point had no name, and a mark (? Name) was placed against it.

"In the hurry of dispatching this chart from the ship this ? appears to have been inked in by a rough draughtsman and appeared as Cape Name, but the stroke of the "a" being very indistinct, it was interpreted by our draughtsman here as C. Nome, and has appeared with this name ever since.

"This information is from an officer who was on board the *Herald* when the chart was being constructed."

So the mystery of the name has been satisfactorily solved.

GEORGE DAVIDSON,
Department of Geography,
University of California.

GEOGRAPHIC NOTES

EXPLORATIONS IN ALASKA

THE U. S. Geological Survey had four important parties at work in Alaska during the past season. As a result, large sections of territory previously unmapped and but little known have been well explored geologically and topographically.

The first party, under command of Mr. W. J. Peters, assisted by Mr. F. C. Schrader, left Seattle early in February. They went by trail from Skagway to White Horse, and then pushed on with dog teams 1,200 miles to Bergman, a trading post on the Koyukuk River. The year previous a cache of canoes and provisions had been made at this point in anticipation of the trips which the party under Mr. Peters and another under Mr. Mendenhall were to make. The party then advanced about 100 miles, to the summit of the divide between the Yukon and the Arctic Ocean, to select the best route to the ocean. Here they made a portage of several miles across to the waters of Colville River, which they followed to the Arctic Ocean. After leaving Bergman they were in territory that had previously not been penetrated and was entirely unknown. Mr. Peters reports that rolling tundra extends from the mountains to the ocean. The original plan for the party was on reaching the Arctic Ocean to turn east, and then return to Bergman over land, but the season was so late that Mr. Peters decided to proceed westward. The party obtained some small canoes from the natives and pushed along the shore to Point Barrow. Here they obtained a whaling boat, which they hoped would enable them to reach Cape Nome. When 350 miles down the coast they fortunately fell in with a collier, which shortened the remainder of the journey to Cape Nome.

The second party, under Mr. T. G. Gerdine, assisted by Mr. A. J. Collier, sailed from Seattle June 1 with twelve pack animals and reached Nome in the middle of June. They found the season there very backward, so that it was several days before they were able to begin active work. The last week in June they proceeded in small boats to Teller, about one hundred miles to the northwest, the pack train following them along the beach. The mapping of Seward Peninsula, including the whole of the Nome mining district, begun last year, was brought to a successful termination.

The third party, under Mr. W. C. Mendenhall, assisted by Mr. D. L. Reaburn, starting from Fort Yukon, made a survey of the Yukon River as far as the Dall River and up the Dall River to the portage across to Old Man River, and down this river to Bergman. Here they also made use of the cache placed there the year before. From here they proceeded up the Allashook River, and then down the Kowak to Kotzebue Sound. The territory that they passed through after leaving Bergman was unknown. The party has not yet returned to Washington, so that further information about their work cannot be had.

The fourth party, under Mr. A. H. Brooks, worked in southeastern Alaska. For two months Mr. Brooks' labors were on Prince of Wales Island and the mainland to the northeast, investigating the mineral resources of the country. He reports much development of the country in progress. Another month was passed in making a reconnaissance of the region to the north extending from Juneau to Skagway.

CERTAIN PERSISTENT ERRORS IN GEOGRAPHY

IT is strange that many legends which a generation ago were accepted as true, but which have long since been disproved by geographers, should still be accepted by the general public, and even included in many geographic textbooks. Mr. Henry Gannett, in a recent article in the Bulletin of the American Geographical Society, enumerates a number of these errors and shows wherein they are at fault.

It is a persistent idea that the presence or absence of forests has an influence upon the amount of rainfall. The arid and desert regions of the world, more particularly the shores of the Mediterranean Sea, have been cited as the result of man's wanton destruction of forests. In this case, however, the absence of forests is not the cause but the result of the desert. The geographic nature of the Mediterranean region, the configuration of the land and water, and the prevailing winds are of such nature as to permit only of a light rainfall. These conditions have existed for many thousands and perhaps for millions of years, and from the nature of the mountains, cliffs, and cañons of the region it is apparent that they have been evolved in a dry rather than in a moist climate.

A second widespread error is that the floods of our rivers have recently been much greater and more frequent than in former years, also due to destruction of the forests. The cutting away of forests is usually, however, followed by a thick growth of bushes and underbrush, which holds the water as effectively. Mr. Gannett cites the case of the Ohio River as a proof that the floods are not more frequent in recent years. This river has been gauged continuously, and the gaugings show very little change. Whatever change has taken place in the forest areas of its basin.

Another error is the citing the existence of fiords as a proof that the coast has been sinking. These gorges are partially filled by the sea, and it has been argued that they must necessarily have been cut when they were above the sea-level. On the coast of Alaska we now have similar fiords in the process of formation by glaciers which at their lower ends are often hundreds of feet beneath the surface of the water. Undoubtedly the Norwegian fiords were likewise cut by glaciers extending below the surface of the water. The coast of Norway may be sinking, but the fiords are not evidence of it.

Mr. Gannett believes that perhaps the most prevalent error concerns climate. It is generally believed that the mild climate of Western Europe is produced by the Gulf Stream, which washes its shores; that the severity of climate in the northeastern part of the United States is a result of a current from the Arctic flowing along the coast, and that the mild climate of Northwestern America is induced by the Japan Current, also sweeping down the coast. Each of these beliefs is based upon the supposition of a great body of water moving thousands of miles in one steady stream. As a matter of fact, both the Gulf Stream and the Japan Current lose their velocity long before they reach their supposed destination, and the Arctic current is proved not to exist. Mr. Gannett then proceeds to explain the conditions of the climate of these representative portions of the earth as follows: The land absorbs heat rapidly and as rapidly gives it off, while the water absorbs heat slowly and holds its heat longer. The sea has a much more uniform temperature because of its constant motion. The prevalent winds of the northwestern coast of Europe blow from the sea, which is warmer than the land in winter and cooler than the land in summer; hence the mildness of England's climate in summer and winter. The prevalent

winds in the eastern part of North America are from the west—from the land; hence the severity of climate of the eastern part of the United States and Canada—great cold in winter and great heat in summer. The prevalent winds in the western part of the United States are from the ocean, and hence, as in the case of England, its climate is mild.

Another persistent error is found on many maps, which represent the main system of the Cordillera as running in a direct line to the Arctic Ocean just west of the mouth of the Mackenzie, whereas it has been shown that the mountain system follows the coast of Alaska, forming the "Backbone of the Alaskan Peninsula," including the great mountains of St. Elias and McKinley.

THE DEATH RATE IN THE UNITED STATES IN 1900

THE records of death in 1900 were registered by census enumerators in an area including somewhat more than one-third of the population of the United States. These returns show that the death rate in this registered area was 17.8 per 1,000 of population. The area for which records were obtained included Connecticut, District of Columbia, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, Maine, and Michigan, and 53 cities of 8,000 or more population in other states. The population included was 28,807,269, or about 38 per cent of the entire population of the United States.

The death rate in 1890 for an area somewhat less was 19.6 per 1,000, so that apparently the death rate in the United States has decreased 1.8 per cent in ten years. It must not, however, be inferred that all this decrease is due to the improved health and vitality of the American people. Mortality statistics must necessarily be always uncertain. Probably the records of death at no census were so efficiently and thoroughly registered and verified as at the census of 1900; but a difference in results is the necessary consequence of a more perfected registration—that is, the difference of figures in the percentages of death rate in 1890 and 1900 does not necessarily imply an increase or decrease in the death rate, but may be the result of a more accurate registration. It is, however, gratifying that the difference in percentages is in the nature of a considerable decrease.

The Census Bulletin (no. 83) treating of the mortality statistics for the year 1900 contains a multitude of interesting tables, but the figures must for the most part be taken with due allowance. For instance, St. Joseph, Mo., is recorded as having a death rate of only 9.1 per cent per 1,000 in 1900; St. Paul's death rate was 9.7, though ten years before it was half as much again, 14.9—a remarkable advance in the healthiness of the city! On the other hand, Charleston, S. C., would appear quite unsafe to live in, for its death rate, 37.5, is four times that of St. Joseph. Natchez, with a death rate of 39.7, is even more unhealthy than Charleston.

CHILE'S DISPUTES WITH PERU AND BOLIVIA

THE Pan-American Congress has aroused attention to the long-standing disputes between Peru and Chile and Bolivia and Chile. After the overwhelming defeat of Peru and Bolivia by Chile in 1883, Peru was forced to surrender unconditionally to her conqueror the province of Tarapaca, which is larger than the states of Vermont and New Hampshire combined. Peru was also compelled to surrender the province of Tacna and Arica for ten years, at the end of which period the people of the province were to decide by a *plebiscité* whether they would continue allegiance to Chile or resume their allegiance to

Peru. In 1894, when the time for taking the *plebiscité* came, for various reasons advanced by Chile, the voting was deferred, and it has since been repeatedly postponed, notwithstanding the protests of Peru.

The province which is in dispute has an area of 8,688 square miles, about the size of Massachusetts, and a population of 25,000. It has been a source of great revenue to the Chilean government because of its guano and rich nitrate deposits. The occupation of Chile has now lasted for seventeen years, so that even if a *plebiscité* should be taken, the chances are that the decision would be in favor of its retention by this more enterprising government.

Bolivia, in penalty for her defeat, was compelled to mortgage to Chile the Littoral department, which was her only province bordering the Pacific Ocean. Finally she formally ceded it to Chile in 1896, with the condition that at least one port on the Pacific Ocean be granted her. This concession Chile has steadily refused, but she has offered $2,500,000 in compensation, an offer rejected by the Bolivians, who assert that Chile has made $300,000,000 out of the province.

The Littoral has an area of 29,910 square miles. An evidence of its commercial value to Chile is that its population doubled during ten years, 1885–1895. Its source of wealth consists in its rich nitrate deposits.

COMMERCE OF THE UNITED STATES

FOR the first time in the history of the United States the exports of the country for one year have exceeded in value one and one-half billion dollars. In the twelve months ending August 31, 1901, the value of the exports of the United States reached the tremendous total of $1,500,613,236. The value of the imports for this same period amounted to not much more than one-half of the value of the exports—in figures, $843,681,360. Our annual exports now exceed the annual exports of Great Britain.

The Bureau of Statistics of the Treasury Department in a recent report gives the following interesting table, which shows the imports and exports from the United States during the twelve months ending August 31 of the last six years:

Year ending August 31—	Imports.	Exports.
1896	$737,163,827	$906,403,525
1897	756,673,034	1,066,603,779
1898	623,192,020	1,236,643,922
1899	723,232,313	1,269,504,882
1900	848,675,810	1,399,000,520
1901	843,681,360	1,500,613,236

Thus the exports have during the five years increased more than 50 per cent, while the imports have increased less than 15 per cent.

The growth in exports during these years has, as is well known, included all great classes of products and manufactures. During the last year, however, the exports of manufactures have not kept pace with those of other industries. In the eight months ending with July, 1901, the latest month in which the details are accessible, exports of manufactures fell $32,000,000 below those of the corresponding months of last year, while exports of agricultural products were $57,000,000 greater than those of the corresponding months of last year. This reduction in exports of manufactures is about equally divided between copper and iron and steel, the reduction in copper exports being about $16,000,000, and in iron and steel about $16,000,000. The reduction in copper exports, according to the Bureau of Statistics, is chiefly due to the decreased demand for copper in other parts of the world. In exports of iron and steel the reduction is apparently explained by the partial suspension of manufacturing activities in certain lines in July and August, by the reduced demand abroad,

by the reduction in prices of the articles exported, and in large part by the fact that the exports to Hawaii and Porto Rico, which were included in last year's statistics, are not included in the figures for the present year, the total exports of iron and steel to these islands in the fiscal year 1900 having been about $7,000,000.

IMMIGRATION DURING 1901

NEARLY half a million immigrants entered the United States during the fiscal year ending July 1, 1901. This number was some 40,000 more than that of the previous year and more than double that of 1898, the year of smallest immigration for 22 years. A comparison of the arrivals during 1901 with those of 1882 shows in marked degree that the character of the immigration has very radically changed, a fact also discussed on page 385 of this number. In 1882, when 788,992 immigrants entered the country, the largest inflow in the history of the United States, the northwestern countries of Europe, Germany, Norway and Sweden, Great Britain, and Ireland, furnished the bulk of the new Americans. During 1901, on the other hand, the arrivals from these countries formed but a very small share of the inflow. Their place was taken by Austria-Hungary, Italy, and Russia.

For instance, in 1882, 250,630 Germans entered the United States, but in the fiscal year just ended their number fell to 21,651, the number of Swedes from 64,607 to 23,331, and of the English from 82,394 to 12,214. Meanwhile the number of Italians has increased from 32,159 in 1882 to 135,996 in 1901, and of Russians from 21,590 to 85,257.

The following table shows the number of immigrants from the principal European countries during the two years compared and the per cent of the total immigration contributed by each country.

Immigrants from—			Per cent of total.	
	1882.	1901.	1882.	1901.
All countries....	788,992	487,918		
Austria-Hungary	29,150	113,390	3.7	23.2
Germany.....	250,630	21,651	31.7	4.4
Denmark.....	11,618	3,655	1.4	0.7
France	6,004	3,150	0.7	0.6
Italy	32,159	135,996	4.0	27.9
Netherlands	9,517	2,349	1.2	0.5
Norway.....	29,101	12,248	3.7	2.5
Russia	21,590	85,257	2.7	17.4
Sweden	64,607	23,331	8.2	4.7
Switzerland.....	10,844	2,201	1.3	0.4
England	82,394	12,214	10.4	2.5
Ireland.....	76,432	30 561	9.7	6.2
Scotland.....	18,937	2,070	2.4	0.4

EXPLORING TIBET.

THE Japanese Buddhist Priest, Mr. Nokai, who went to China in November, 1898, to visit Lassa, Tibet, to study the Lama philosophy, is now making his third attempt to reach that forbidden land, his two previous attempts having ended in failure. The first attempt was made by way of Szechuen and the second by that of Kansu, and now he is trying the Yunnan route. Miss E. R. Scidmore, Foreign Secretary of the National Geographic Society, is confident that he will reach Lassa this time. The explorer left the provincial capital of Szechuen on February 21 and reached the capital of Kuichau on March 9. Writing his impressions of Kuichau, he says that Roman Catholic churches are found at all the important places in the province, showing the untiring zeal with which the French missionaries have been conducting their work. The number of the Miaotsz aborigines in Kuichau and Kwangsi is believed to reach ten million. The French missionaries that had withdrawn from Yunnan on the oc-

casion of the Boxer disturbance last year have already come back to their field of operation, and Mr. Nokai saw them repairing or rebuilding the churches damaged or destroyed on that occasion.

Tali-fu, he writes, is rich in natural scenery, with the rivers clear and the mountains well covered with woods. Marble is the chief product of this district, and there are over 100 marble works in the suburbs of the city, which, however, is a comparatively lonely town, containing at best 4,000 houses, though it boasts of the presence of several government offices, including those of the local military commander and the taotai. The Santa temple in Tali, built over a thousand years ago, is a religious edifice widely known throughout China. Every year for five days, ending with the twenty-second of March (old calendar), a great festival is conducted in the precincts of the temple, to which throng hundreds of thousands of visitors and merchants from the Kwang provinces—Hunnan, Kiangsi, Yunnan, and Szechuen. Three pagodas stand in the temple ground, the largest being fifteen stories high. The city presents a queer appearance, owing to the mingled residences of several different races—swarthy Hindus, copper-colored Tibetans, and Chinese. The place seems to mark a boundary between civilized and barbarous regions.

The Russian Expedition to Spitzbergen to measure an arc of the meridian has returned to St. Petersburg after having successfully completed the work. The party reached Spitzbergen the latter part of June, and during the summer have been working in harmony with a similar Swedish expedition. The Russian and Swedish governments have for several years been actively promoting the measurement of the arc.

The Twenty-second Congress of the geographical societies of France met at Nancy in August, 1901. Twenty societies were represented. The principal resolutions adopted advocated the establishing of colonial bureaus in the principal towns of France and her colonies in order to educate young men and women for work in the colonies; the early construction of a complete canal system in France, and the passing by the National Assembly of regulations to promote the national birth rate.

The Testing of Arctic Currents by setting casks adrift upon the ice, originally proposed by Rear Admiral Melville, has been continued the past summer. In August the revenue cutter *Bear* deposited fifteen specially constructed casks at different points on the ice in about 72° 20′ north latitude, between Point Barrow and Wrangel Island. The spot where each was set adrift was carefully noted and recorded. Each cask contains instructions to the finder to inform the U. S. Hydrographic Office where and when the cask was picked up.

The Academy of Sciences at St. Petersburg has received from Baron Toll a telegram announcing that he has reached the Gulf of Taimur. One member of his party succeeded in reaching the Nordenskjold Islands, and Baron Toll himself was about to explore Chelyuskin. It will be remembered that Baron Toll's party left St. Petersburg on May 8, 1900, with the intention of forcing a way along the northern coast of Asia to the Bering Sea, all the while making careful scientific observations and endeavoring to connect the voyages of the *Fram* and *Jeannette*.

The U. S. Commission on Fish and Fisheries has appointed Dr. C. H. Gilbert, of Leland Stanford University, to take charge of the deep-sea investigations by the commission about the Hawaiian Islands. Dr. Gilbert will sail on the *Albatross* from San Francisco about De-

cember 1. The dredging and other work will be made from this vessel. For the past ten years Dr. Gilbert has been professor of zoölogy in the Leland Stanford, Jr., University, and is the joint author with President David Starr Jordan of "Synopsis of the Fishes of North America." For a number of years he has also had official connection with the Fish Commission.

American Progress in the Philippines.—During the three years since the American occupation of Manila 6,000 miles of telegraph lines and cables have been laid in the Philippine Islands by the U. S. Signal Corps. It is now possible to telegraph from Cape Bojeador, on the extreme north coast of Luzon, to the capital of the Jolo Archipelago, 1,000 miles distant. Governor Taft, at Manila, can thus be informed at almost a moment's notice of happenings in all sections of the archipelago. Three years ago, to send a message from Jolo to Manila required nearly three weeks.

U. S. Biological Survey.—Dr. C. Hart Merriam, Chief of the Survey, during the past season has been studying the zones of distribution of the fauna of southern California. He was also a month in the Sierra Nevada with John Muir engaged in similar work there. Mr. Preble, of the Survey, was making collections in the region of the Great Slave Lake. Specimens of the fauna of the five Arctic regions—Labrador, Hudson Bay, the Mackenzie River and the Great Slave Lake, the Yukon River, and the Alaskan coast—are now possessed by the Survey.

National Geographic Society Lectures.—On another page of this Magazine appears the program of lectures presented in Washington by the Society during the season of 1901–1902. The course is comprehensive, including the main problems of a geographic character, that are of interest and importance to the American public. Each subject is to be treated by an eminent authority who has had exceptional opportunities for studying the topic which he will discuss. To select a more interesting and valuable program would in fact be difficult. The majority of the lectures will be published in this Magazine during the coming months.

The Imperial Geographical Society of St. Petersburg has received letters from Lieutenant Kozloff, who was sent out in March, 1900, to explore the sources of the Yellow and Yangtze rivers. During the summer of 1900 the party made important surveys around the headwaters of the Yellow, and then, because of hostile natives, turned south toward the sources of the Yangtze. Later, in March, 1901, they fell in with a caravan traveling from Lassa to Szechuen, and gave them the letters for St. Petersburg. The party was not attacked in 1900, but a report is now current in St. Petersburg that they were attacked during July, 1901, near Kobdo, and twenty men of the party slain. Kobdo is in Mongolia, about 100 miles from the Siberian border, and was the starting point of the expedition.

The U. S. Coast and Geodetic Survey has established a magnetic observatory at Sitka, Alaska, and is constructing another at Honolulu, Hawaii. At these stations observations will be made simultaneously with those taken by the British, Swedish, and German expeditions to south polar regions, beginning in February, 1902.

The Survey will soon dispatch the *Pathfinder* to the Philippine Islands to assist in charting the harbors and coasts, which will then be actively begun.

During the past season parties from the Coast Survey have been charting Cross Sound and Icy Strait, which form the northern approach to Juneau and

Skagway. The many channels between the Fox Islands of the Aleutian Archipelago were another object of work.

A Map of the Philippine Islands on the scale of 15 miles to an inch is in course of preparation by theU. S. Signal Corps, and will be ready for distribution about January 1, 1902. During the past year much new information has been obtained by military and civil expeditions throughout the islands, which will be incorporated in the new map. The map will contain the greatest number of names yet published on any map of the archipelago, the spelling in all cases being according to that approved by the U. S. Board on Geographic Names in its recent report. The military telegraph lines and cables, commercial and military telegraph stations, telephone stations, open ports, coastwise ports, and light-houses will also be indicated, as well as the boundaries of the provinces as established by the Commission.

The Antarctic, carrying the Swedish south polar expedition, sailed from Gothenburg October 16. Prof. Otto Nordenskjold, the leader of the party, states that they will proceed to Buenos Ayres and Tierra del Fuego, and then push as far south as is found possible. When winter comes on a party of six under Nordenskjold will land and spend the winter making scientific observations. The *Antarctic* meanwhile will return to Tierra del Fuego in charge of one of the scientists of the party, who will conduct researches in that little explored country. Thus, while the Germans are exploring the regions south of the Indian Ocean and the British that south of the Pacific Ocean, Dr. Nordenskjold and his party will be at work in the regions south of the Atlantic Ocean. Professor Ohlin and M. K. A. Anderson go as zoölogists, Dr. Bodman as hydrographer, Dr. Skottoberg as botanist, and Dr. Ekolof as medical officer.

Depth of the Atmosphere Surrounding the Earth.—The Belgian Royal Meteorological Observatory has published the estimates made by various mathematicians and physicists regarding the depth of the atmosphere surrounding the earth. The calculations of the various scientists upon this subject recently given in *The Scientific American* are widely divergent. Biot estimated that the depth was only about 40 miles; Bravais, 70 miles; Mann, 81 miles; Callandrau, 100 miles; Schiaparelli, 125 miles; Marie Davy, 187, while Ritter stated that it reached to a height of 216 miles. In Great Britain, during the early part of the last century, the depth of the atmosphere was generally accepted as being 47 miles, but the fact that meteors became incandescent at a much greater altitude proved that this calculation was at fault. Sir Robert Ball states that meteors have been observed at a celsitude of more than 200 miles; and since they only become incandescent when they come into contact with the air, the calculation of Ritter appears to be the most correct.

In Bolivia, in the region that lies between the crest of the Andes and the great Amazonian Plain, an expedition equipped and sent out by Sir Martin Conway is continuing his work. The country cannot be called wholly unknown, as large areas have been visited by native prospectors, but it has never been scientifically explored and mapped.

It is from the famous gorges of this region that the Incas obtained much of their gold, and in the fertile valleys is grown some of the best coffee in the world. The leader of the expedition is Mr. Jones W. Evans, a well-known geologist and traveler, who has made his name known by good work done in the western part of Brazil. With him are an assistant geologist, a surveyor, a botanist from the United States, and a zoölogist. They hope to make

extensive scientific collections, which will be presented on their return to the museums of London and New York.

The party of French engineers sent out at the request of the Bohemian government are also actively engaged in making a triangulation that will enable a complete survey of the country to be made.

The Division of Mining and Mineral Resources of the U. S. Geological Survey has published a chart showing the mineral products of the United States during the calendar years 1891–1900. The chart, compiled under the supervision of Dr. David T. Day, is published in advance of the annual report of the Survey for 1900, which will soon be ready for distribution. During 1900 the value of the mineral products of the country for the first time exceeded one billion dollars, reaching $1,070,108,889. More than half of this amount, or $552,418,627, consisted of metallic products, and $516,690,262 of non-metallic products, while about one million dollars is unspecified. Pig-iron formed about one-quarter of the value of the mineral products of the year, amounting to $259,944,000. Then followed bituminous coal, with a value of $221,133,513; copper, $98,494,039; Pennsylvania anthracite, $85,757,851. The value of the gold products exceeded that of the petroleum by over three million dollars—$79,322,281 as against $75,752,691. Silver followed next, with $77,070,461. Our mineral products have doubled since 1887 and trebled since 1880.

Oscar Neumann, the eminent German explorer, has reached Khartum after a year and a half journeying in Central East Africa, more particularly in Southwestern Abyssinia. With Baron Erlanger and several companions, he left Zeila in January, 1900. The movements of the Mad Mullah prevented them from going far into Eastern Somaliland, so they turned westward and visited the holy towns of Sheikh Hussein and the holy mountains of Abulnass and Abulcassim. Later they traveled to the capital, Addis Abeba, by a new route. Leaving this town in November, they proceeded to Lake Stefanie, carefully mapping much new country. Their most important work was in the southwestern provinces of Abyssinia and in the British territory to the west around Lobat. The hardships of travel had reduced them to serious straits, when they fortunately came upon a steamer carrying Slatin Pasha and Bluett Bey, who took them to Khartum.

The publication of the results of Herr Neumann's journey will be awaited with much interest, as almost nothing is known of large sections of the country he traversed. It is reported by telegram that he has brought back the largest zoölogical collection ever made in Central Africa.

Geological Explorations Near Athens.—The British Museum during the past summer has obtained some important fossils of Tertiary animals at Pikermi, near the Marathon Road, about 12 miles from Athens. The specimens were found at a considerable depth below the bed of a mountain torrent, and were so jammed together that evidently the animals were buried alive, probably by torrential action. About 50 years ago Dr. Albert Gaudry, in this locality, obtained a great number of fossils for the Paris Museum. Since then the Vienna Academy has made a smaller collection; but until the present year the British Museum had sent no expedition to this field. Among the principal finds were numerous bones of *Hipparion*, the three-toed predecessor of the horse; *Helladotherium*, a short-necked giraffe allied to the *Okapi*, the new mammal recently discovered by Sir Harry Johnston in the forests of the Kongo State; several

skulls of *Mastodon*, and skulls, teeth, and bones of the great saber-toothed tiger *Machærodus*, specimens of which have also been found in England. One of the prizes was the remains of perhaps the largest tortoise ever found in Europe. Very few bones of rodents or of birds were found, but a considerable collection of land shells was obtained. Dr. A. S. Woodward, who was in charge of the excavations, has forwarded to the British Museum 47 large cases of fossils.

Bathymetrical Survey of the Fresh-water Lakes of England.—In his presidential address to the Geographical Section of the British Association, at Glasgow, Dr. Hugh R. Mill announced that Sir John Murray and Mr. Laurence Pullar had resolved to complete the bathymetrical survey of the fresh-water lakes of the British Islands. Mr. Pullar has conveyed to trustees a sum of money sufficient to enable the investigation to be commenced at once and to be carried through in a thorough and comprehensive manner. The work is intended as a memorial to Mr. Pullar's son, Mr. Fred Pullar, who had begun the survey of the lochs of Scotland and was drowned in Airthrey Loch in February, 1901, while endeavoring to save others. Sir John Murray has agreed to direct the scheme and to be responsible for carrying it out. All the lakes of the British Islands will be sounded and mapped as a preliminary to the complete limnological investigation. The nature of the deposits, the composition of the water, the rainfall of the drainage areas, the fluctuations in the level of the surface and in temperature, and the plants and animals in the lakes will be carefully noted. Their geological history will also be an object of study. Probably five years will be required to complete the work. Memoirs will be published as the task progresses, giving the complete natural history of the lakes of one river basin.

Damascus and Mecca Railway.—The first section of the railway that is to connect Damascus and Mecca was opened in September. Reports from Constantinople give an interesting account of the opening ceremonies. Thousands of spectators had gathered at Mezireh in the early morning. Sheep were sacrificed and earnest prayers offered for the prompt and successful completion of the railway and for the long life of the Sultan. Then the governor general of Syria, accompanied by sheiks, ulemas, and prominent men of Damascus, boarded the railway carriages, which were decked with Turkish flags, and the train moved off amid the shouts of the enthusiastic Mussulmen. The arrival of the train at the other end of the section, Dera, was likewise greeted by an immense crowd. The Sultan in his palace on the Bosphorus, 1,000 miles away, meanwhile was receiving bulletins telling of the successful opening of the railroad.

Much importance is given by the Turkish papers of the capital to the construction of this route. They credit the Sultan with originating the plan, and state that as soon as the connections between Damascus and Mecca and Medina are completed he will push the construction of the road northward to connect with the Anatolian railway to Constantinople. The political importance of this road cannot be overestimated. It will bind together the provinces from Constantinople to the Gulf of Aden, and enable the Sultan to concentrate his troops at any point between the capital and the gulf, either to quell domestic disorder or resist foreign encroachment.

GEOGRAPHIC LITERATURE

A Gazetteer of Alaska, by Marcus Baker, is in the printer's hands and will soon be ready for distribution by the U. S. Geological Survey. Gazetteers of Cuba and Texas are being compiled by Henry Gannett, also to be published by the Survey.

Reports on Military Operations in South Africa and China, just published by the Military Information Division of the War Department, forms a concise and excellent summary of military events in these respective parts of the world until April 1, 1901. The volume is accompanied by many maps, one of South Africa being especially valuable.

"Boundaries of the United States, States and Territories, with Outline of History of Important Changes," by Henry Gannett, is the title of Bulletin No. 171, recently issued by the U. S. Geological Survey. As the title indicates, the report gives a sketch of the successive boundaries of the United States, of its states and territories, as defined by treaty, charter, or statute. The text is well illustrated by maps and diagrams.

Recent Important Publications by the Bureau of Statistics of the Treasury Department are "National Debts of the World," "Porto Rico, Hawaii, Philippine Islands, Guam, Samoan Islands, and Cuba, their area, population, agricultural and mineral products, imports and exports by countries, and the commerce of the United States therewith," and "Commerce of Mexico, Central and South America, and the West Indies, with share of the United States and other leading nations therein, 1821–1900."

A List of Maps of America in the Library of Congress, by P. Lee Phillips, Chief of the Division of Maps and Charts, has been recently published by the Library of Congress. This very valuable volume is preceded by a list of books relating to cartography. The maps are listed chronologically and include such as were in the Library at the time of the opening of the new building, in November, 1897. Since that date there have been many important editions, which will be included in a supplementary volume.

A bibliography of geographic publications of 1900 is issued as the September number of *Annales de Geographie.* The 908 entries are very comprehensive, including memoirs published in government reports and in the proceedings of societies and in leading periodicals. The volume is edited by Louis Raveneau, with whom are associated some forty eminent geographers, Drs. Wm. M. Davis and R. De Courtney Ward, of Harvard University, representing the United States. Sixty entries are of subjects relating to the United States, a larger number than that of any other country.

The High Plains and Their Utilization is the subject of a report by Willard D. Johnson in the Twenty-first Annual Report of the U. S. Geological Survey and now published in separate form. Mr. Johnson believes that the great plains and arid regions west of the Rockies that form Colorado and New Mexico and the western portions of Nebraska, Kansas, Oklahoma, and Texas were formed by deposits from the mountain chain. Gradually, however, the region

was broken up by streams flowing off the eastern slope. The effect of this erosion is very perceptible in New Mexico and Colorado, and is gradually eating away the portions that remain.

The Relation of Sparrows to Agriculture, by S. D. Judd, Ph. D., are given the results of a careful study of the value of these birds to the farmer and agriculturist. The report is published by the Biological Survey as Bulletin no. 15, prepared under the direction of Dr. C. Hart Merriam. Sparrows are notorious seed-eaters; but as we have not positively known whether they preferred the seeds of weeds or of useful plants, it has been impossible to state definitely whether they injured or helped the farmer. An examination of the stomachs of 4,273 sparrows has shown, however, that sparrows feed chiefly on the seeds of noxious weeds, and are therefore of economic value.

Dr. Charles H. Townsend, of the U. S. Fish Commission, is the compiler and editor of a volume, published by the Commission, giving the dredging and other records of the U. S. Fish Commission steamer *Albatross*, with a bibliography relative to the work of the vessel. The author accompanied most of the cruises of the vessel as naturalist during the last fifteen years. The volume gives the data of 1,786 hauls of the dredge. The dredging covers areas extending from the banks of Newfoundland, along both coasts of North and South America, to Bering Sea, with a few limited areas in the tropical Pacific and between Japan and Kamchatka. The deepest haul was 4,173 fathoms.

The Report of the Secretary of the Smithsonian Institution for 1900 forms a handsome volume of over 700 pages, with 100 full-page plates and maps. It consists of two parts—the report of the Secretary to the Board of Regents, which is a summary of the work of the Institution in all its departments during the past year, and a general appendix, dealing mainly with the advance of knowledge in the different fields of science during the nineteenth century. In the latter part of the report Mr. Langley has included some forty papers summarizing the century's progress in astronomy, aëronautics, chemistry, physics, electricity, geology, geography, biology, and in special lines of study, as malaria and yellow fever. Some of the papers are reprints from memoirs previously published, while others are contributions specially prepared for the report. The volume forms the most important compendium that has yet been published of what man has done during the nineteenth century to advance knowledge.

The most notable memoir in the volume is entitled "The New Spectrum." In this paper Mr. Langley presents a brief summary of his discoveries during twenty years made possible by the invention of the bolometer. Twenty years ago to register the change of temperature of one ten-thousandth of a degree Centigrade was considered remarkable. Today, by means of the bolometer, which has been continuously perfected, it is possible to register one one-hundred-millionth part of a degree.

The immense field of knowledge that is opened by such a study of the sun's heat is appalling. Mr. Langley hints that it may be possible to foretell the seasons, which write their coming upon the records of the spectrum. He concludes the memoir with these words: "We are yet, it is true, far from able to prophesy as to coming years of plenty and famine; but it is hardly too much to say that recent studies of others, as well as of the writer, strongly point in the direction of some such future power of prediction."

NATIONAL GEOGRAPHIC SOCIETY PROGRAM OF LECTURES AND MEETINGS

The Popular Course consisting of thirteen lectures will be delivered in the National Rifles Armory, G street between Ninth and Tenth streets northwest, on Friday evenings at 8 o'clock, commencing November 8 and alternating with the Technical Meetings which will be held in the Assembly Hall of Cosmos Club. Experience has shown that it is unwise to arrange lectures too far in advance, as points of geographic interest shift rapidly; hence only the following dates have been definitely assigned:

November 8.—The Twelfth Census . . . . Honorable FREDERICK H. WINES
Assistant Director of the Census

As a practical sociologist, Dr. Wines has given special attention to the classes and movements of our population as ascertained by the Census Office, and his lecture will form the first public presentation of interesting facts and conclusions reached during the past year.

November 22.—The Interior of Borneo . . . . . Prof. A. C. HADDON
Oxford, England

The natives of Borneo were the object of study of an expedition dispatched to the island from England in 1898–1899. As leader of this expedition, Prof. Haddon obtained much interesting information about the peoples and country of the little-known interior.

December 6.—Peary's Progress Toward the Pole . . . . HERBERT L. BRIDGMAN
Vice-President Arctic Club of America

Mr. Bridgman will describe the lands nearest to the Pole discovered by Peary in his recent arctic campaign. Peary is now beginning his fourth consecutive winter in the land of snow and ice.

December 20.—The Trans-Siberian Railway . . . . . Honorable E. J. HILL

As a member of important committees in the House of Representatives, Mr. Hill has taken a practical interest in the extension of American influence, and has just returned from the Orient over the Trans-Siberian railway. His journey gave opportunities for observations of much interest, which will receive first announcement through the Society.

January 3.—The new Mexico . . . . . Honorable JOHN W. FOSTER
Ex-Secretary of State

General Foster was U. S. Minister to Mexico during the years 1873–1880, when the republic was just starting on that phenomenal career of development which raised it to a prominent position among nations and placed its president among the world's great leaders. Twenty years later (in 1901) he revisited the country as its guest; and his observations and impressions will form the theme of his lecture.

January 17.—American Progress and Prospects in the Philippines. General A. W. GREELY
Chief Signal Officer, U. S. Army

General Greely is on his way home from an extended tour among the Philippine Islands. As an example of American progress in the Philippines, it may be stated that 6,000 miles of telegraph lines and cables have been put up in these islands by the U. S. Signal Corps in the three years since the capture of Manila. Telegraph and cable connections are now complete between the northern coast of Luzon and Jolo, 1,000 miles to the south.

Arrangements have also been made for the following popular lectures, at dates to be announced later:

The Appalachian Forest Reserve; Honorable JAMES WILSON, Secretary of Agriculture.
The Warship and its Work; Rear-Admiral W. S. SCHLEY.
Fifty Years of Immigration; Honorable E. F. MCSWEENEY, Asst. Com. Immigration.
Cliff Dwellings of Mesa Verde; Mrs. JOHN HAYS HAMMOND.
Explorations in New York City; Mr. JACOB A. RIIS.
Finland; Mr. GEORGE KENNAN.

Provisional arrangements have been made for lectures on Pacific Cables, Actual and Proposed; Our Coming Oceanic Canal; America Before the Advent of Man; Chinese Problems; Lands and Life in Ocean Depths; Colombia; Danish West Indies; and Afghanistan—the Buffer State.

Regular Meetings of the Society for the reading of technical papers and discussions will be held in the Assembly Hall of Cosmos Club on Friday evenings, at 8 o'clock, commencing November 1, and alternating with the Popular Lectures.

November 1.—Symposium on the Growth and Prospects of the Society . Pres. GRAHAM BELL
Followed by Professor HEILPRIN and others.

November 15.—The Lost Boundary of Texas . . . . . MARCUS BAKER
Cartographer, U. S. Geological Survey

November 29.—The Best Isthmian Canal Route . . . . . ARTHUR P. DAVIS
Chief Hydrographer, Isthmian Canal Commission.

December 13.—The Northwest Boundary:

C. H. SINCLAIR
U. S. Coast and Geodetic Survey

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THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. XII DECEMBER, 1901 No. 12

CONTENTS

DIARY OF A VOYAGE FROM SAN FRANCISCO TO TAHITI AND RETURN, 1901. ILLUSTRATED. S. P. LANGLEY . . PAGE 413

THE LOST BOUNDARY OF TEXAS. ILLUSTRATED. MARCUS BAKER 430

ICE CAVES AND FROZEN WELLS. W J McGEE 433

WESTERN PROGRESS IN CHINA 434

GEOGRAPHIC NOTES. ILLUSTRATED 436

GEOGRAPHIC LITERATURE 442

NATIONAL GEOGRAPHIC SOCIETY 448

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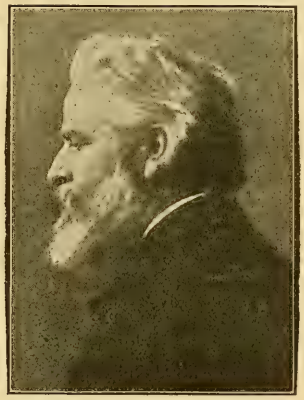

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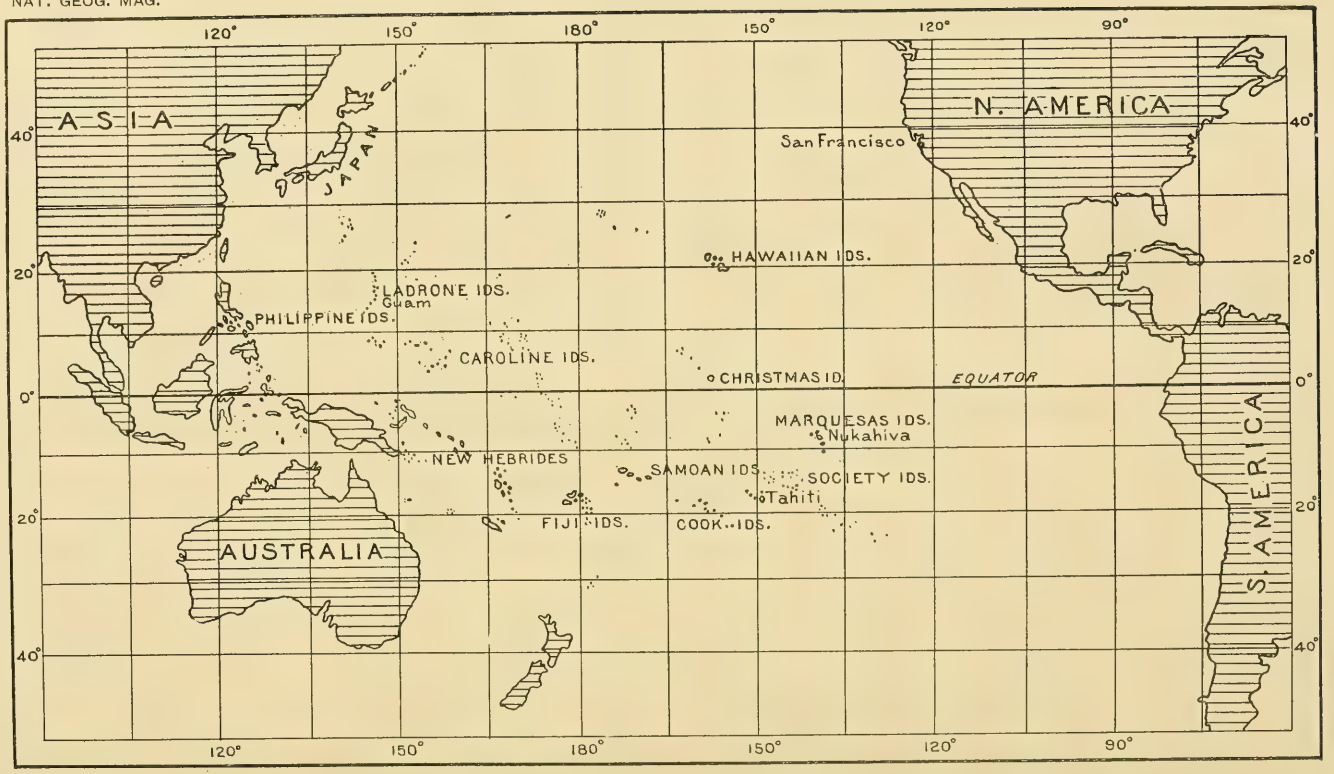


Outline Map Showing Position of Tahiti in Mid Pacific

VOL. XII, No. 12 WASHINGTON DECEMBER, 1901

THE NATIONAL GEOGRAPHIC MAGAZINE

DIARY OF A VOYAGE FROM SAN FRANCISCO TO TAHITI AND RETURN, 1901

BY S. P. LANGLEY

PREFACE

UNTIL lately Tahiti (Cook's Otaheite) has been reached from the United States only by a sailing schooner from San Francisco in a voyage of six or seven weeks. There has been an occasional steamer from New Zealand; and the French, who are in possession of the island, send a warship at intervals; but on the whole the islanders are in very much the same condition that they were a hundred years ago.

The French Government has just subsidized a vessel of the Oceanic Steamship Company, which is to make a trip to Tahiti once in every five weeks, the voyage lasting only about eleven days. On the occasion of the French National Fête, on the 14th of July (1901), the company advertised a trip widely throughout the United States.

I was led to think that the occasion was one for seeing the native ways and customs of the islands before the innovations that would be introduced by the steamer communication in the future, and, expecting to have a companion, I had arranged to take the voyage. My companion failed me at the last moment, and I took the trip alone, commencing my diary with the departure from San Francisco. I have published it as written at the time, without modifying the style such diarial notes naturally take.

June 25.—In the morning of the 25th of June I went down to see the *Australia* at the dock. She is a long, narrow vessel, painted white, of 3,200 tons burden, with great piles of lumber on her main deck, and evidently both old and overloaded. I secured my passage with some misgiving.

June 26.—Going down to the boat at 9.30 a. m., I hear from more competent judges than myself the confirmation of my feeling that the boat is extremely overloaded. The depth to which she has sunk in the water and the lumber on the decks say this even to a landsman's eye; but when I get on board of

her, things in other respects look better. She has a prepossessing set of officers, and as the first-cabin passengers are only about forty in number, there will evidently be plenty of room. A considerable part of the passengers appear to be minor French officials, but there are also some Californians, who promise pleasant company, and it appears that many of the passengers are not going to stay, but are on a pleasure trip. We are told that we are to stop at the Marquesas Islands, the scene of Herman Melville's adventures in "Typee," there to take on 300 Marquesan savages, who are going to Tahiti to participate in the French fête on the 14th of July.

The vessel flies the French flag. We get under weigh very promptly at ten o'clock and pass through "the Golden Gate" into the Pacific, running for three or four hours directly down the coast and within a mile or so of it. A great black whale, a mile or two away, thrashing about and throwing up his tail, is an interesting object. The sea is not high, but comes freely onto the main deck, which is perhaps only six feet out of water! We are accompanied by an increasing number of "goonies," a dark brown bird, spreading five or six feet of long narrow wings, the notable character of which is that they are at all times, in sailing flight, carried *below* the body. It flapped and then sailed with extreme swiftness, constantly turning till the line joining the wings was almost vertical, and in this position the tip of the lower wing appeared to just graze the water, but I never saw it pick up anything in this flight.

The table is good for a vessel of the kind. There are some pleasant passengers, and there is an electric light and ice-making plant, so that the vessel is better than her looks.

June 27.—It is cold enough to make semi-winter clothing comfortable, and I turned in at 9.30 o'clock and slept for ten hours in spite of the occasional seas which broke over the main deck in solid water, once striking against my stateroom window on the upper deck (starboard side) with a bang, as if they would stave it in. Our course was south, and even south by east. Vessel rolls less. It is still pleasantly cool; bright sun.

June 28.—Slightly overcast and misty; not as cool, but not hot; read and conversed with fellow-passengers.

June 29.—Today, about noon, we enter the tropics. The run has been 316 miles. The days are still cool; the weather is just right. I sit forward on the broad upper deck, beneath the awning, with four or five pleasant people; read, talk, sleep, and am content. Most of the passengers are on the port side of the main deck below, the vessel rocks lullingly, and there is an occasional mist. The last "goony" left us today.

> "The Injian Ocean sets an' smiles,
> So sof', so bright, so bloomin' blue;
> There aren't a wave for miles an' miles,
> Excep' the jiggle from the screw."

June 30.—Sunday; no observance. Day slightly warmer, but pleasant. We are about half way to the Marquesas, and no sight of a sail nor any sign of man, probably, until we get to them. One does not like to think of fire or an accident happening *here*.

The captain has an instrument, which he calls a *Pelorus*, for getting the true course of the vessel by the sun—something like a marine solar compass.

Got a list of Tahitian words from a lady passenger, Mrs. Hart, the wife of the Captain Hart mentioned in Stevenson's South Seas. Stevenson says that in 1878 (when he wrote) cannibalism was not yet extinct in the Marquesas, whose inhabitants he calls the most savage of the South Seas. Mrs. Hart confirms Stevenson's account of the massacre on her husband's plantation, and his account in general. He mentions that the natives were prevented by the French Government from carrying away whole the bodies of the slain

to eat, but, finding a lot of empty match-boxes, they cut up one body into small pieces and sent it as tid-bits in these little boxes over the island!

July 1.—In the "Doldrums;" much warmer. A white gull with a long feather in its tail (the "tropic bird") and sundry flapping and diving birds accompany the vessel.

July 2.—Frequent showers; warm.

July 3.—Vessel rolls a great deal, many sick, but I am exempt. Cool wind and very pleasant.

July 4.—Pass the Equator at 7 a. m. ship's time. Celebration by the Americans—speeches, one by Judge K., brief and appropriate. In afternoon, games, "chalking the deck," mock prizes, etc.

July 5.—A little warmer. We are to see Nukahiva tomorrow morning.

THE MARQUESAS

July 6.—Awoke at 5.30, dressed, and went on deck. It was a quarter of an hour before sunrise, but only the eastern sky was bright. The boat's engine had stopped, and the bow was pointed to a great mass of rock of jagged outline, yet covered with green nearly to the summit, all laying to the north of us. The sun below the horizon seemed to radiate greenish-blue fan-shaped streamers, the sky between and below which shifted rapidly between these and primrose tints, or what was not primrose, but some nameless shade of delicate quickening color, that we all looked at in delight. Just before the sun arose the bright light struck between the awning and the deck and lit up the groups of passengers on a dark background with an effect like that of the lime-light at a play. It was perfect, unless it might have been charged with being a bit theatrical!

The vessel anchored half a mile from the shore. The harbor of Tyowai is on the south of the island. We waited two or more hours, apparently until the French official in charge had finished his breakfast, and only at 9 o'clock we went ashore. I believe A. was the only one who remained on board. He prophesied intolerable sand flies and heat for us, but we found neither.

The old queen, who was the last authentic relic of the ancient sovereignty, had died 24 days before, so there was nothing to see but the mission. The nuns gave us something they called lemonade—a mildly fermented sort of drink.

The shore was covered with cocoanut, breadfruit, and orange trees. There were no native houses, only 30 to 40 European-built wooden ones, and everything, except perhaps the mission, had an air of shabby decay. The island's population is said to have dwindled from 18,000 to 350. The missionaries, I understand, whether Catholic or Protestant, feel obliged to admit that as a rule they have been able to change the natives' lives in external form only. Clothing is worn and hymns are sung instead of savage songs; marriage is nominal, and underneath this everything is absolutely as it was in pagan times.

A little outrigged boat, with one man, had come out with a few bananas and "vees," a sort of small mango, pear-shaped, with a thin banana-like skin and a very juicy interior, having a mild pineapple taste. But this was the only thing good save the cocoanuts, of whose water we drank abundantly. We had been expected for long; our arrival was what might be called the great event of their year, but no one paid any attention to it. No one got anything ready to sell or came off to see the ship, except the man in the little boat, until just before we were leaving.

The natives wear European dress, when they wear anything, the women being in very gaudy French calicoes. The men, especially the elder, are tattooed, the effect being that of uniform bands of olive-greenish color across the face, rather than any design. One old lady, however, had her left hand and wrist elaborately tattooed, and I was told

Gathering Cocoanuts

that it was the hand with which she ate "poee." A boy "walked" up a tree and knocked down half a dozen cocoanuts, the milk of one of which I drank. I have tried to get some breadfruit cooked and some fresh fish; so far unsuccessfully. I have returned to lunch and am writing this on the deck, not meaning to return to the shore.

Four large boats are coming round the eastern point, sounding conch-shells and beating drums. They are from a neighboring valley and come, to the number of fifty or more natives, to execute a dance for our party, which I am not going on shore again to see. The 300 natives whom it was advertised the ship would take to Papeete have not appeared. We are told that they had made great preparations for going, but that the governor had changed his mind.

And Typee! The proprietor of the Typee Valley, Mr. G., is on board. He describes it as having two or three families living on it and some wild cattle, as containing two or three square miles, and as being five or six miles long. It must be much as it was in Melville's time, but without the inhabitants. The path to it, leading over the mountains, is visible from the ship It is a slow ride, two hours long, or about six miles from the harbor, although Melville wandered for days in getting to it. It is described as having the most considerable stream of the island running through it (but without the little lake Melville mentioned) and as being lined with ancient "Ti's."

The mouth of the bay where the Typee Valley enters the ocean and where Melville escaped, is visible from the ship, eight miles away, and the Happar Valley must be between us and it. So near—and we sail at 4!

Got, with Mr. K. (a merchant of Papeete and a passenger), a basket of beautiful fresh fish, alive, of varied colors—some pure crimson, some striped with green, etc. Mr. K. sent a man to get them, or we should have had none, the natives being too lazy to catch any.

We took on four horses which were swum out to the ship. It was curious to see the naked natives diving under the kicking beasts to attach the hoisting gear. We took on two or three Frenchmen and as many natives (instead of the 300!) and sailed at 5 o'clock.

July 7.—Nothing to record.

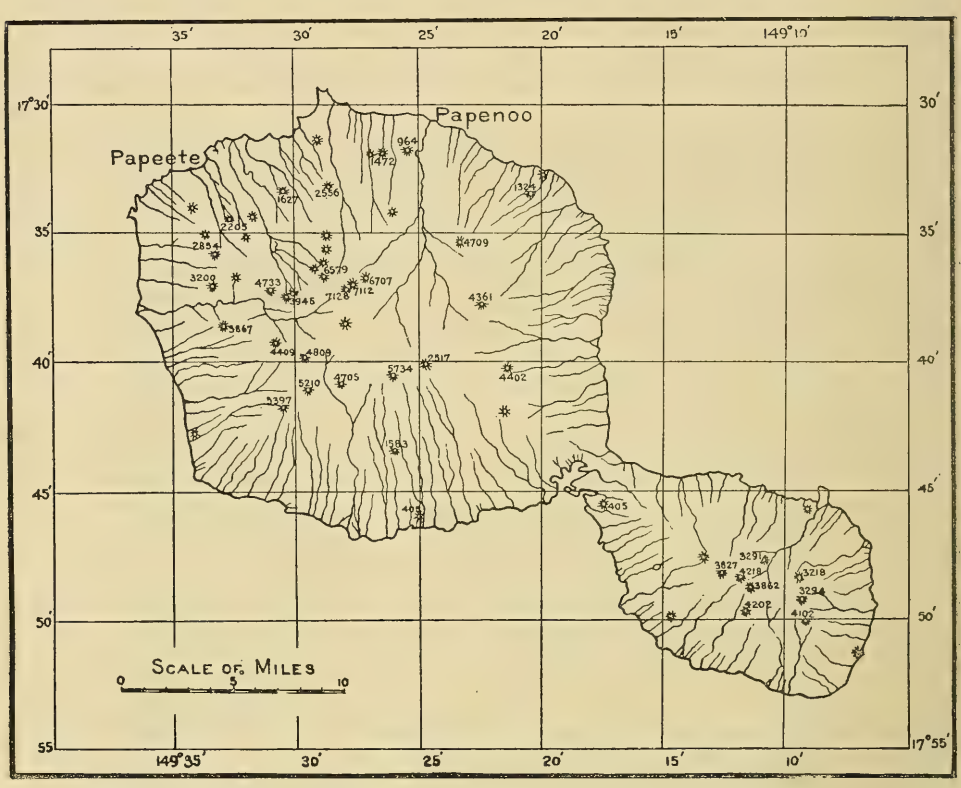
July 8.—After a somewhat rough night, a beautiful morning. The vessel (at 8) is passing an "atoll" some 30 miles long and, I suppose, 8 or 10 broad from rim to rim, the low beach being covered with trees, but a few of which are cocoa-palms. They say that the natives of these atolls have all the pearl-fishing in their own hands, the French government not allowing the competition of diving machines. The great gain is not in the pearls, but in the shells, which bring a hundred times as much profit, on the whole, being very large and worth in Tahiti about 90 cents in American money per kilo. They sell in London for £300 sterling the ton, so that for once the natives get a fair share of the profit, some of them making, in the best season, 30 or 40 Chile dollars (the Chile dollar is as large as our silver dollar, but passes for only 40 cents) a day at the opening of the fishing.

The greatest depth an expert diver can go is about 70 feet, and the extreme time he can stay under water is said to be a little over two minutes.

We are through with the dangers of the night, and are enjoying the prospect of landing tomorrow morning.

TAHITI

July 9.—We arrived off Tahiti early in the morning. It is a pile of mountains clothed with green to the summits, more than 7,000 feet high, with a narrow strip of low land between their feet and the sea, in which narrow space nearly



Map of Tahiti, showing the many rivers that flow from the high mountains in the interior.

all the natives live, the whole lofty interior being uninhabited. In the center is a fantastic group called "The Diadem," and opposite, 15 miles away, is a most picturesque island, Mourea. I take the first boat ashore and am rewarded by reaching K.'s store at 9.45 a. m., in time to order some clothes (to be done tonight) before every one has gone to his (French) breakfast, after which all business ceases for two or three hours.

The town is stretched along the shore, and has nothing of interest. It has no hotel, and no markets of any kind, except for the things which nature furnishes the natives gratis; not so much as fresh eggs are to be thought of, the only eggs being brought by our own ship from San Francisco.

The rest of the day is passed on the ship, while Mr. K., our general provider, and immediate agent of Providence, is trying to get horses and vehicles for an excursion around the island. In the evening he reports that he has gathered four or five conveyances, sufficient for a party of twenty to go around the island. That number join (two-thirds of the party being ladies), and I, seeing nothing else, join with them on the understanding that I do not go all the way around, but have a carriage to myself and leave at "the neck."

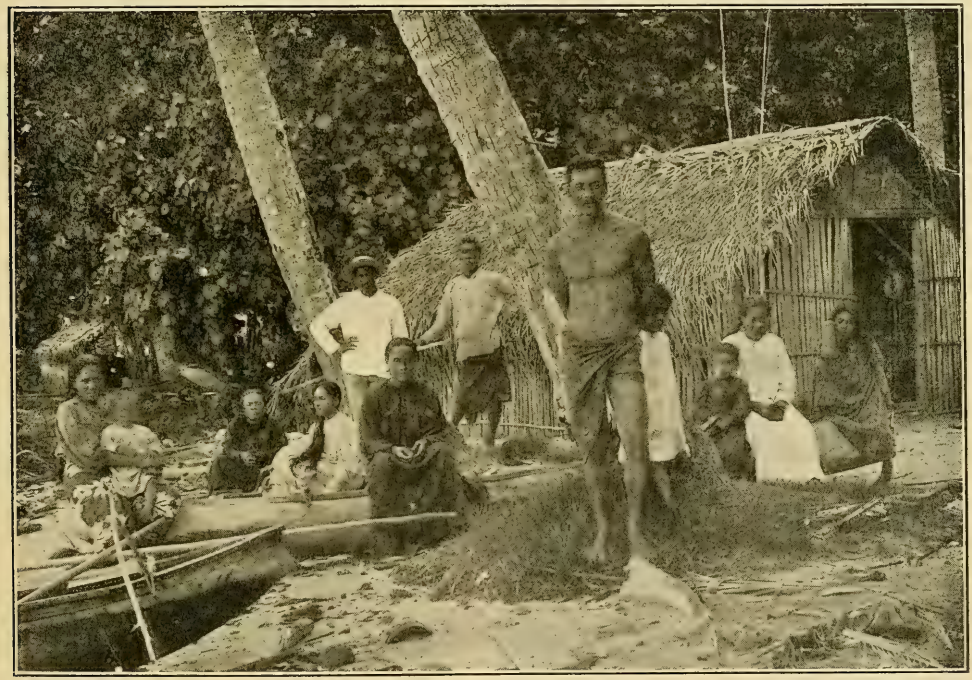
July 10.—The party starts from K.'s store at about 9. Mr. K. has sent

couriers around the island, both ways, to announce our coming to the chiefs who are to provide for us.

We pass through sugar plantations, and go by Mr. K.'s country place. On his lawn, between his house and the Pacific, are two old sacrificial stones. He says he is sure of finding plenty of human bones there when he uncovers the site. We go on by a delightful shady road close by the sea, till, at 12.30, we stop at Papenoo for a native breakfast. The principal dishes are (1) breadfruit cooked (baked) in leaves. It cuts like soft, very fine cheese, and I can hardly define the taste, but it is mildly pleasant. (2) Young pig, fed exclusively on cocoanut. It tastes half cocoanut, half pig! It is eaten with a sauce of sea-water, lime, and cocoanut juice. (3) Fish. (4) Oranges, cocoanuts, and other fruits. (N. B.—Cocoanut water and Bordeaux mix very well.)

The pigs, mostly little black creatures, appear to have been left by the Spaniards 300 years ago, and to be the only animal known to the island, and the only quadruped known to the older natives. Pig ("pua"), then, has become the generic name for animals; thus, a horse is *pua horo*, "the pig that runs over the ground," man (as an edible) is *long pig*.

The native women sing "himinies" with some very striking effects. The voices have something plangent and metallic in them, yet are melodious and in harmony. In the first song, at the end of each verse, all stopped suddenly, giving the effect of the "couac" of the opera singer. In all the verses there was an undertone beneath the song. This undertone continued alone for a few seconds at the end of each verse, after the superposed song was finished, and died out separately and slowly, like



Robinson Crusoe Hut

the drone of some great bagpipe. The natives gave names to each of us, mine being "A-to-hi," which means "qui a les lauriers."

The place where we breakfasted (at Papenoo) was a semi-European house belonging to the chief of the district. It was a large one-story shed-like building. We left at about 2 o'clock, and traversed a still more lovely embowered road, with the sea dashing on the rocks within a rod much of the way. The land and the rocks were covered with verdure, this green meeting the open ocean without any intervening beach. We forded stream after stream, until my jaded little rats of horses gave out in the middle of each and had to be helped on.

I had taken the lead, so that the procession could not get on without helping me forward to clear its own way. The ride was prolonged until the anticipated two hours became four; the fords grew worse and worse, and I, for one, was well tired when, just after six o'clock, and in the twilight, we arrived at another chief's, who had a large shed of three rooms, with the floor covered with beds. Most of the houses, however, were "Robinson Crusoe" huts, neatly built of upright bamboo. The natives are wilder than those near Papeete. The men are often naked, except for a loin-cloak of gaudy calico, no dress of native cloth (tappa) being, as a rule, worn by either sex.

We supped much as we breakfasted, except that I was instructed in the proper way of eating "Poee," the clinging plastic mess of starch-like consistency which so clung to Melville's fingers in Typee. The secret is simple—imitate the native, who puts his fingers in water first, then in the "Poee," and then sucks them dry. I chose to sleep out of doors on a mattress in the wagon, amid the cocoa palms, the passing forms of the natives, and the lights from the cooking fires. The novelty of the situation kept me awake a good deal. The nearby surf sounded in my ears all night, and the sea breeze was so cool that I drew my rubber overcoat over the coverlet for warmth.

July 11.—I awoke with the noise of the natives in the early morning twilight, and went down to the beach. This was covered with rough stones and shell heaps, which made walking difficult; but I got into the water and let the Pacific roll over me, and going back just as the sun arose, ate one of the oranges from the trees about me like a simple savage!

After breakfast we moved on, over roads and through rivers which grew increasingly difficult for about ten miles. This is the wild part of the island. The road grew in places too narrow to let a wagon pass quite in safety between the cliff on the right and the sea, and finally we came to a river which was five feet deep opposite the place where we entered it.

Turning down the river we drove in it to a ford where the water only just covered the floor of the wagon, and then turned up the stream again to where the landing was to be made, and here was the tug, to get over the fallen trees which encumbered the stream, and up the steep bank. The horses struggled, the natives filled the water with their heads and brown bodies, tugging at their horses' heads and lifting the wheels; some of the wagons filled, and some of the ladies were carried ashore on the backs of the islanders. We all got safe ashore, but it was lively while it lasted.

When we got to "the neck" the main party went on and I turned back to go down the civilized side of the island, over bridges and a good road to Tati's.* I got to Chief Tati Salmon's house about 2.30, where I was

* Chief Tati Salmon, the head of one of the oldest families and most considerable chiefs of the island, is so public a character that I need hardly apologize for mentioning his name and his hospitality here.

Crossing a Ford

Landing

warmly welcomed. I lay down and slept till near dinner time. Then I dined in state on the portico with Tati and his two sons. Our dinner was of soup, fish, dressed in native style, with cocoanuts, shrimps, and I forget what else.

The manner of these sons was very good, and to their father it was most respectful. I noticed a pretty cover on a table, which Tati said was a chief's mat. He offered to get one for me.

Tati, whom I had met in Washington, is the son of a native mother and a white father, and his family, a very ancient one, is still one of the most prominent, as he is one of the best educated and most intelligent, of the islanders. He mentioned to me that the chiefs were much at war in his great-grandfather's time, and that the object being to get the heads of their enemies, these were cut off and buried by the relatives of the dead in some secret place. Tati said also that the heads of some of his own family were buried in a place in the mountains, whose position he only approximately knew, the secret of the exact locality being kept by some old member of the clan. I have heard from others that his great-grandfather had large ideas of housekeeping. There is on the island a pitcher plant holding two or three tablespoonfuls of water; and, according to tradition, the old chief occasionally had a thousand men or so marched up in the morning, each with a pitcher plant stuck in the right ear, and the emptied contents formed the great man's bath.

After dinner I opened a topic which proved interesting to us all, the "supernatural" of the island. We talked for two hours, and I heard of the "fire-walking." One of Tati's sons said that he, at a fire-walk given in Tahiti three years before, having on shoes, had followed the barefooted priest over the "red-hot" stones, and that his shoes were not burned in the least.

July 12.—This morning I started at 8.30 and drove to Papeete, stopping for a bath in a stream, and getting in at about 2; breakfasted at the execrable restaurant, went to the ship, and then came to Apouhara Salmon's, a son of Tati's, where a room had been procured for me. Here I spent the afternoon. Just opposite is a large open space where the natives congregate with drums and sing "himinies" in preparation for the fête, and the place is not silent! Apouhara had gone out in the morning to meet me, but missed me on the way. I saw his wife, who is the daughter of the queen of a neighboring island, and Miss Salmon, Tati's sister, a very intelligent and agreeable lady.

July 13.—Drove out alone this morning to the Fatoua stream, described in Loti's "Rarahu" * as the bathing place. The pools he mentions are gone, I am told, but I drove up the side road along the bank of the stream for at least two miles, and came to a long, deep pool, shaded by trees and high hills. It is about 200 feet long and over head in the middle. The water is just cool enough, an ideal bath. As we rode back, I got some fresh cocoanuts from the trees, and drank all the water from one of them, eating part of the snowy cup. Oh, the pleasant memory!

I came back to Apouhara's, when I met Tati's son, who had taken part in the former fire-walking ceremony. I asked him to breakfast with me at the "Hotel du Louvre," which he did. There I saw a copy of the *Wide World* of June 1, containing an illustrated account of the recent fire-walking ceremony in Honolulu, conducted by the old native priest, Papa-Ita, a man of about sixty years of age, who is in town, and to whom young Tati introduced me. He is not the high priest (who lives in one of the Windward Islands), but a disciple, and he says he will give an ex-

* Pierre Loti, "Rarahu," 1880, reprinted 1882 under the title "Le Marriage de Loti."

Cook Island Chief

The Road to Point Venus

hibition here on Wednesday. I offered to pay for the wood for the fire, if necessary. The old man says he could teach the art in about a month. It consists, as I understood, in mystic rites, but there is no physical anointing. The prophet said he was going to pray for the next two or three days, and I sent him to his home in my carriage.

I went on board the steamer and told the captain, the ship's doctor, and U. S. Consul Doty of the prospective exhibition. Apouhara says that when Papa-Ita was here in 1897, any number of the people (15 or 20) followed the priest through the fire. When all are through some one calls, "All out," and the priest turns around and marches back again. If he turns and looks back before all are out, those still there will be burned!

Arranged with a French livery-stable keeper for a horse and carriage tomorrow.

July 14.—A wretched horse and carriage came, and I went to the Fatoua Pool and had another delicious bath. Came in and went to the ship, where I saw Mr. K., and spoke to him about the fire-walk. He attributes the "miracle" to the natives' horny-soled feet, but does not explain how tender feet of Europeans are not burned.

Paid extravagant bill at the wretched "Hotel du Louvre," and arranged to take subsequent meals on ship. Mr. K. promises to get me a two-horse team, and to send "Frank" around today at 1 o'clock, if he can find him, but he has not come. (Today is the French 4th of July and the occasion of the government fêtes to which the whole island has come.)

July 15.—Went out to the public dancing and singing, in competition for prizes offered by the government. It takes place in the square before the government house, and everybody is there, either performing or looking on. Almost the whole population of the island has come.

The chief interest among the islanders seems to lie in the competition of singing "himinies," and next to that, in the dancing, which is pantomimic as much as regular. As a public show, most of the native dances are unpresentable, so that, I have understood, the authorities have had some difficulty in finding a dance which will do for such an occasion. Savages are here from the neighboring islands, a fine-looking chief from Cook island taking a part, and a woman from the same island gave a little of the presentable part of the "Hoola Hoola." Her body would be quivering like a jelly, and suddenly grow rigid as a statue—a notably odd effect.

In the afternoon there were regattas, the most interesting one being the rowing of one of the ancient double war canoes, or a modern duplication of it. There were 42 rowers, or rather paddlers, and they got up a "spurt" of speed which I estimated at about seven miles an hour. On this afternoon we sat on the deck and watched the wonderful sunset behind the fantastic peaks of Mourea. It would have been a time to quote Byron—

> "Slow sinks more lovely ere its course be run
> Along Morea's hills the setting sun."

only that the tropic sun does not descend slowly.

Frank, my driver, came at 1 o'clock with the old carriage and one horse. I drove Mrs. K. out to Point Venus,

Cook Islanders

The Pile of Stones Ready for the Fire Walk

and saw Cook's "meridian" stone. Frank says his own family and their ancestors have always lived near here, and that their traditions say that Cook's vessel was first seen by the natives from this point, and that he landed here. In the evening the whole Apouhara family went out, leaving me to keep house.

July 16.—More "himinies" in morning. In one very good dance by the Cook islanders over thirty persons take part. They sit down in three rows, representing rowers in a canoe, while two scull and steer. They have paddles, and paddle to the sound of drums. A lookout man sweeps the horizon till he sees a big fish, and the canoe rows for him. One of the steerers sharpens a harpoon and passes it forward, and the fish (a man dressed in red) is harpooned. There is a tremendous time in pulling him in; he runs around and entangles the line among the bystanders, and finally he gets a second harpoon in him, is hauled on board, and (in pantomime) cut up with an ax, dismembered,

and eaten by the crew. Everybody is in motion, but it is rather a pantomime than a dance.

I went and had another glorious bath in the Fatoua Pool and came back in time for lunch.

THE FIRE WALK

In the afternoon I went over to see preparations for the fire-walking. Within a hundred yards of the ship a shallow pit is dug (not apparently oriented to any point of the compass), about 9 feet by 20 feet by 18 inches deep. This is to be filled with firewood, and the stones heaped on the wood. These are smooth, water-worn, volcanic stones of varying size, but all rather large and weighing, at a guess, from 15 to 50 pounds. The number of the stones was about 200, and their average length about 15 inches.

Old Papa-Ita says that a woman who lived there long ago and who died and became a devil (or goddess) is the one to whom he prays and by whose mediation he passes unhurt through the fire.

"The aids began to turn the stones over with long green poles, which burned at the ends."

Papa-Ita, . . . with a large bunch of Ti leaves, . . . began to walk through the middle rather hurriedly

I have spoken to several respectable natives who separately walked through it after him three years ago here, who all agree that they felt little heat on their feet, but a good deal on their heads, their ears, and their hands.

July 17.—This morning arranged to pay $6.30 (Chile) for five dozen fish, which were delivered early and put on ice; then went with Mrs. K. and bought the best shawl to be obtained in town for Mrs. Apouhara; paid for the chief's mat and other things which Tati had ordered for me, and then left my lodgings for the ship. I bathed for the last time in the Fatoua Pool; called on the governor and left my card and Ambassador Cambon's letter, getting an answer from the governor promptly, with an invitation to call at 4 o'clock, which I was obliged to decline on account of the fire-walk at that hour.

In preparation for the fire ceremony, I took a tin ship's measure full of fresh water, which held very nearly 5 quarts and, by weight, 9.2 pounds. The empty tin weighed 1.1 pound. This is to be used in half-filling, with three or four measures, a large wooden bucket or tub with fresh water, into which one of the smaller hot stones from the center of the fire is to be put after the ceremony.

I am told that the fire was lighted at a little after 12. I arrived, with Captain Lawson, Dr. McNulty, Chief Engineer Richardson, and two assistants. The wooden bucket, containing 3½ im-

perial gallons of fresh water at a temperature of 20 Reamur (77° F.) was provided, together with iron rakes from the engineer's room. The firewood was scarcely sufficient for a good heating; the stones in the center and beneath were, however, undoubtedly "red-hot." The outer enclosure, surrounded by canvas walls, was about 120 feet by 60 feet.

Mr. Ducarron, the U. S. Deputy Consul, says that Papa-Ita tried to carry on his exhibition in another island at the base of a hill composed of hard limestones, from which he exclusively used stone. (This was in Raiatea).

The fire there, I am told, invariably burned for 4 or 5 days before, and the stones became coated with lime. I learn that on one occasion, the French authorities having forbidden him to perform in his usual place, he made the "oven" of other stones, heating them for 36 hours. On attemping to cross, he walked only part of the way and ran the rest. His two disciples and a woman also ran across, and the woman's feet were so badly burned that she was laid up for a week. The prophet and his disciples declined to have their feet examined, and cleared out of sight. For corroboration, Mr. Ducarron says I may refer to M. Rousselot (address, Ministère des Colonies, Paris).

NOTES TAKEN ON THE SPOT WHILE THE PERFORMANCE WENT ON

At 4.40, when the priest came in, the stones on the side of the pile would bear to be touched by the hand.

The aids began to turn the stones over with long green poles which burned at the ends. The upper stones were none of them red-hot on top; the lower ones, two layers deep, however, could be seen to glow between the others, but they were only near red-hot in the center.

The old priest, Papa-Ita, beat the near stones with a large bunch of Ti leaves three times, and then began to walk through the middle rather hurriedly, followed by two acolytes, who appeared to shun the hot central ridge, and walked along the sides. Then he walked back, followed by several; then back once more with an increasing crowd, most of whom avoided the center. The horny-footed natives did the best. One white boy took off his shoes, but could not stand the heat upon his bare feet, and stopped. At this point (*i. e.*, after the second passage forward and back), I had the hottest stone of the pile in the center, on which the feet had certainly rested several times, hauled out and placed in the water bucket. The stone was much larger than I had reckoned or wished. A trifle of the water was spilled by the plunge, and the rest boiled hard and continued to do so for about 12 minutes. At the end of that time the stone was still too hot to handle, and I sent to the ship for a sack to hold it, directing the remaining water to be measured. It was a long stone; the lower part had been immersed in the central fire, and it was certainly much hotter than the average center stones. During this time other persons walked over the stones without special preparation, the disciples still dodging the hot central line and following near the cooler part. I asked Papa-Ita if he could take upon his hand a small hot stone near the center. He said he would, but he did not. Next many white persons walked over, stopping long enough to lean over and lightly and quickly touch the hottest stones with their hands. Mr. Ducarron walked to the center and stood there shifting his feet (he had on thin shoes) from stone to stone for about 10 seconds before finding it too hot to stay.

After this the outer crowd was allowed to come inside the barrier. It was a capital exhibition of savage magic and well worth seeing, but no miracle!*

*See Nature, August 22, 1901.

July 18.—We left at 10.30 a. m., the ship's upper deck being hung with bunches of bananas. As we went out of the harbor we passed wonderful green-yellow water inside the barrier reef, and we went over to the Island of Mourea (described in Melville's Omoo) to give the passengers a chance to visit it on the side not distinctly seen from Tahiti. It is very irregular in outline, with much finer cliffs than on Otaheite, and has one or two beautiful bays said to be good harbors. I understand that it would not be difficult to secure the whole island for a small sum.

We turned and went northward, bidding a good-bye to Tahiti and its "Diadem," which we are never likely to see again.

July 19.—The vessel rolls a good deal. The temperature is pleasant.

After lunch, weighed the stone which I got from those used in the fire-walk. It weighs 65 pounds, is about 15 inches in its longer diameter, and displaces 3½ imperial gallons of water. After weighing, it was thrown overboard, a piece having been broken off to take home with me.*

July 20–24.—On the 23d the sea almost glassy, reflecting the clouds.

On the 24th the smoke ceases to blow southwest from the funnel, and blows nearly south. The weather is still warm, but shows signs of getting cooler.

On the 25th, I think, or some later day which I did not note in my diary at the time, the whole sea around the ship seemed to be animated with spouting whales. We could see them at a distance as they rolled or played; and once a great shining black back, 20 to 30 feet of which was out of water, came directly toward the quarter of the ship, and was so near that we could have thrown a stone on it, when, apparently catching sight of the vessel, Leviathan dove, and made "the deep to boil like a pot," leaving a quarter of an acre of foaming ocean where he had gone down.

The diary does not appear to have been kept up for the next few days, which were pleasant, but uneventful.

In the early morning of the thirtieth of July we waited in a dense fog, and then moved slowly in through the Golden Gate, and reached the dock at San Francisco at about one o'clock.

* When I reached Washington I found it to be so porous that its specific gravity was but 2.39 and so non-conductible that a small fragment could be held in the fingers like a stick of sealing wax while the other end was made red-hot in a blow-pipe. This non-conductibility is evidently the principal cause of the success of the fire-walk "miracle."

THE LOST BOUNDARY OF TEXAS

By Marcus Baker, Cartographer, U. S. Geological Survey

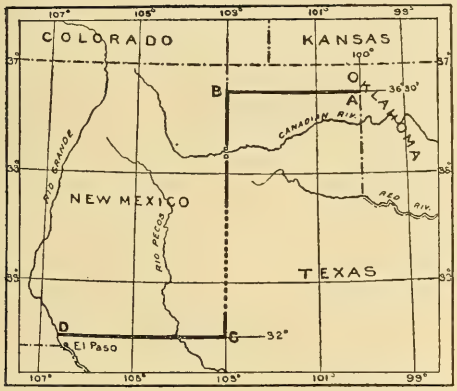
THE law makes the 100th meridian of west longitude the boundary between Oklahoma and the panhandle of Texas. Similarly the law makes the 103d meridian the boundary (in part) between New Mexico and Texas. Recent government maps do not so show these boundaries, but place each one a little west of the meridian with which, by law, it coincides. These discrepancies have led to an inquiry as to the cause and as to our present knowledge of these boundaries.

These and similar boundaries are established as follows: *First*, Congress enacts what the boundary shall be; *second*, the boundary is surveyed and marked in conformity with the law, and, *third*, the survey is confirmed. When all this has been done, the marks set by the surveyor become the boundary. Even if subsequent surveys disclose inaccuracies in the original survey, as it invariably does, nevertheless the monuments originally set, although inaccurately, remain the boundary. Permanence and certainty are of more moment than refinements of accuracy.

If the accuracy of a later and more refined survey was a sufficient warrant for changing a boundary once established, the later survey would itself be subject to like change when itself followed by a survey of yet greater refinement. Thus would result the intolerable nuisance and menace of a shifting boundary. The rule and the reason, therefore, unite in declaring that subsequent surveys are powerless to alter or to fix boundaries. Boundaries become established by mutual confirmation, such confirmation being either formal or presumed from long, notorious, and undisputed acquiescence. It is not the surveying or marking done by the surveyor which establishes a boundary, but the acceptance and ratification of such survey by the parties. If neighbors dispute about their line fence, a surveyor is powerless to settle their dispute without the consent of both. This power to settle vests in the courts, which receive and weigh not only the testimony of the surveyor, but all other evidence pertinent to the dispute. Neglect of these obvious principles lies at the bottom of much boundary contention.

The boundary along the 100th and 103d meridians originated in 1850. In 1835 Texas declared her independence of Mexico, and on December 29, 1845, was admitted to the Union. It then comprised parts of territory now included in New Mexico, Oklahoma, Kansas, Colorado, and Wyoming. In 1850 Texas sold to the United States for $10,000,000 all her territory north of latitude 36° 30′ and west of the 103d meridian as far south as latitude 32°. In the act of Congress of September 9, 1850, effecting this purchase, the boundary here considered first appears. That act recites:

"The state of Texas will agree that her boundary on the north shall commence at the point at which the meridian of one hundred degrees west from Greenwich is intersected by the parallel of thirty-six degrees thirty minutes north latitude, and shall run from said point due west to the meridian of one hundred and three degrees west from Greenwich; thence her boundary shall run due south to the thirty-second degree of north latitude; thence on the said parallel of thirty-two degrees of north latitude to the Rio Bravo del Norte." (See the line A B C D of the accompanying figure.)



CLARK'S SURVEY

About eight years later provision was made for running and marking this boundary by commissioners on the part of Texas and the United States. Mr. John H. Clark, who had had previous experience as an astronomer and surveyor in the "Far West" of antebellum days, was chosen early in July, 1859, as commissioner and surveyor on the part of the United States, and Mr. William R. Scurry on the part of Texas.

It was agreed that the survey should begin at the intersection of the 32d parallel with the Rio Grande near El Paso (D of Fig. 1), proceed east on that parallel to the 103d meridian (C), thence north on the 103d meridian to the northwest corner of the panhandle (B), and thence east on the parallel of 36° 30′ to the 100th meridian (A). With some modifications, due to lack of water and difficulty of travel, this plan was carried out in the years 1859 and 1860.

The station Frontera, of the Mexican boundary survey near El Paso, was accepted as the starting point for longitude, and its longitude transferred, by chaining and triangulation, about a dozen miles northward to the 32d parallel. The party then chained eastward along the 32d parallel for 211 miles, the calculated distance to the 103d meridian, and there set a monument (C). Its longitude was not then nor has it been since checked by astronomical observations. Having set this corner monument, the party started northward, but, owing to the total absence of water, were compelled, after proceeding about 20 miles and setting two monuments, to leave the line and go in search of water. Clark thereupon decided to ascend the Pecos River and measure offsets to the boundary; but the distance proved so great that he gave this up and proceeded to the northwest corner (B) and set about carefully determining this important corner. An astronomical camp was established in its vicinity, on Rabbit Ear Creek, and while engaged in observing with zenith telescope for latitude and moon culminations for longitude a surveying party was sent north about 35 miles to the 37th parallel to transfer the longitude found by Clark, in 1857, on that parallel southward to the parallel of 36° 30′. This was done, and the northwest corner post of Texas (B) established as to its longitude by transfer from the 37th parallel, and as to latitude by independent astronomical observations. Of the astronomical observations made by Clark to check this transfer no use has ever been made. This done, Clark ran southward for 156 miles, chaining the distance, checking by sextant observations, and building mounds or monuments to the number of 23. He then closed work for the season. The result of this season's work of 1859, so far as concerns the 103d meridian, was as follows: Monument set at the south end, fixed in longitude by chaining about 225 miles from Frontera, on the Rio Grande, without astronomical check; monument set at north end, its longitude being derived by transfer 35 miles from the 37th parallel, the longitude on that parallel being based on moon culminations observed in 1857; the running of the line northward from the south end 24 miles and erection of two

monuments; the running of the line southward from the north end 156 miles and erection of 23 monuments, leaving 130 miles between unsurveyed and unmarked.

SURVEY OF THE NORTHERN BOUNDARY

In the following season Clark began work on the 100th meridian, where it crosses the Canadian, and accepting, as directed, the monuments set there by Jones and Brown in 1859 to mark the 100th meridian, prolonged the line northward to latitude 36° 30′, and there built a monument (A) to mark the northeast corner of the panhandle. To check this position he prolonged this 100th meridian northward about 35 miles, to the 37th parallel, and found that the longitude of the northeast corner of Texas on the 100th meridian, according to Jones and Brown, was about 1,700 feet east of the 100th meridian, according to his own determinations on the 37th parallel in 1857.

He then ran west on the parallel of 36° 30′ till forced to leave the line for water. Then he went to the west end and surveyed east till he reached the point where the earlier work ended, thus finishing it. He then disbanded, returned to Washington, and proceeded to work up the results, draw the maps, and make final report. The great war cloud was then hanging over Washington; there was great impatience to close up this work; there appears to have been friction over seeming slowness in finishing up. Accordingly the work was abruptly stopped, unfinished, in January, 1862. So it remained for 20 years. In January, 1882, the Senate by resolution called for Clark's report. The result is a document of 309 pages of field-notes, correspondence, maps, etc., which, while giving much information, leaves much to be desired.

DISAPPEARANCE OF MONUMENTS SET BY CLARK

On March 3, 1891, Congress confirmed Clark's survey of the 103d meridian and of the parallels of 32° and 36° 30′. *Of the 26 monuments set by Clark on the 103d meridian, only two have been reported to the General Land Office.* These are on the banks of the Canadian River. The surveyors, Taylor and Fuss, who connected the public land surveys of New Mexico with these monuments, recognized them as boundary monuments, but made no determination of their longitude.

The initial monument at the northwest corner of Texas has been sought for by subsequent surveyors but without success. Mr. John J. Major sought for it in 1874, failed to find it, and "reëstablished" it, setting a new one, which there is excellent reason for believing is more than two miles *west* of the Clark monument. Mr. Richard O. Chaney, in 1881, set another monument at the theoretical northwest corner of Texas, and this without finding either Clark's or Major's monument. Based upon these and other surveys not here mentioned, the Land Office has concluded that Clark's 103d meridian was laid down between 2 and 3 miles west of its true position, and it is so shown on the Land Office map of New Mexico, 1896. After examining with some care the information on the subject now available, I am of opinion that this conclusion is not sustained by the evidence, and that until the longitude of some monument set by Clark has been telegraphically determined the boundary line should be shown on maps as coincident with the 103d meridian.

It is very desirable that this boundary be resurveyed, old monuments restored, and additional ones erected, before the discovery of oil or mineral shall provoke a boundary dispute.

ICE CAVES AND FROZEN WELLS

A NOTEWORTHY contribution to an interesting topic appears in the August number of the *Monthly Weather Review* (issued October 31, 1901) under the title "Ice Caves and Frozen Wells as Meteorological Phenomena," by H. H. Kimball, of the U. S. Weather Bureau (vol. xxix, pp. 366–371, pls. I–III). The paper is partly a compilation, partly a record of observations on the widely known Brandon well and at other localities; it may be regarded as a supplement to the book on *Glacières, or Freezing Caverns*, published in 1900 by Edwin Swift Balch. The well-known ice caves, and some not so well known, are described critically, with due attention to actual temperatures and to seasons; and a few ice wells are similarly described. The popular idea that the ice accumulates in summer and disappears in winter is rejected in toto; and the author concludes: "It is evident that ice caves and frozen wells are but different manifestations of the same phenomenon. In both cases the cold air of winter circulates to unusual depths below the surface, and freezes the small quantity of water with which it comes in contact. In summer this subterranean circulation of the air ceases, and heat finds its way to the ice only by the slow process of conduction. In consequence, the ice that accumulates during the winter and early spring may not entirely disappear during the following summer, but continue to accumulate for ages."

It is greatly to be regretted that recent writers on ice caves and frozen wells have not extended observation to the "blowing caves," "breathing wells," and "whistling wells" found in various parts of this and other countries, and sporadically recorded in ephemeral literature; for the physical laws exemplified in these are alike, and presumptively connected with those revealed in glacières and ice wells. The fact is too often overlooked that the normal or ordinary cavern is a "breathing cave," in that air currents flow alternately in and out with a degree of regularity conditioned by many factors, among which varying atmospheric pressure is the primary one. The strength of the "breathing" depends on the relative sizes of the opening and of the subterranean vault or chambers; when the mouth is small and the cavern large, the inspiration may be strong enough to suck in dead leaves or sway overhanging branches, while the expiration may suffice to send dry leaves high in air or blow off the hats of incautious visitors; though when the aperture is large or multiple and the cavern small, the current may be barely perceptible. The regular breathing is diurnal, lagging behind the daily range of the barometer by minutes or hours, according to the relative dimensions of orifice and vault; though the diurnal rhythm is modified and sometimes obscured by more general changes in atmospheric pressure, and also by temperature conditions. In cavernous limestone regions where winter snows lie deep, cave-hunting boys soon learn to find hidden orifices and to estimate the magnitude of the caverns by the vapor columns emitted on frosty mornings after a snowfall followed by the customary drop in temperature, the steam columns sometimes rising hundreds of feet in a density rendering them visible for miles. The "blowing well" is the homologue of the "breathing cavern," save that the subterranean vault is replaced commonly by a porous stratum or formation, usually coarse sandstone or granular dolomite; though it is possible that some such wells penetrate or communicate with open fissures or extended crevices in

the rocks. There is a region of blowing wells in southeastern Wisconsin, where the Calciferous beds of the Silurian rest on the coarse-grained St. Peter sandstone; another is reported in central New York, where impervious strata overlie the pervious Potsdam sandstone; still another occurs in England, where it received attention a few years ago in connection with water-supply inquiries; while sporadic examples are by no means uncommon elsewhere.

Now it is evident that when the barometer is high in a region of caves or breathing wells, the subterranean chambers or pervious beds will gradually fill with the slightly compressed air, and that the process of filling will be accompanied by inspiration, or in-blowing, through the open mouth; it is equally evident that with the subsequent fall of the barometer the imprisoned air will expand and force itself outward through the mouth of the cavern until the pressure within and without is brought into balance. Furthermore, it is evident that the air expanding in the throat of the orifice will abstract heat from surrounding substances, precisely as it does in the expansion chamber of an atmospheric ice machine, at a rate and to an amount varying with the pressure-difference; and hence that (provided other conditions be favorable) the moisture on adjacent surfaces may be congealed. In short, under favorable circumstances the breathing well or blowing cave may become a natural ice machine, clumsy and inefficient, indeed, yet possibly making up in magnitude for its simplicity and the slightness of the pressure-differences within its reach. Of course it would seem at first sight that in each passage from low pressure to high and back again, as in the long run, the effects of the natural mechanism would balance—*i. e.*, that the heat given off in inspiration would equal the chill of expiration, so that no refrigeration could ensue; yet when the seasonal ranges of barometer and thermometer are considered, it would seem clear that the heating would tend to culminate in autumn and the chill in spring, in such wise as to sustain the widespread popular opinion on the subject—*i. e.*, that the period of ice-melting runs into winter and that of ice-forming into late spring and summer. In any event the discussion of glacières and freezing wells cannot be regarded as closed until the related phenomena of blowing caves and breathing wells receive exhaustive study.

W J McGEE

WESTERN PROGRESS IN CHINA

MINISTER CONGER has forwarded the State Department a translation of the preliminary resolutions adopted by the recently organized Board of National Administration of China. The purpose of the Board is to institute reforms in China of a more moderate nature than the sweeping reforms proposed in 1898 which brought on the Boxer troubles.

"The things of the West are genuine; those of the Chinese, for the most part, are shams. The speech of Western men is reliable; that of the Chinese largely false," say the Board, and in this spirit of Chinese modesty and humility the resolutions were written. The following extracts are taken from these curious resolutions to show the nature of progress thus far made:*

"The first thing necessary is to manifest resolution like an upright pillar;

*The resolutions are published in full in the Consular Reports for October 28 (no. 1173).

then may one accomplish the splitting of the bamboo—*i. e.*, the difficult task. The Book of History says: 'Hold fast the golden mean.' And again, 'Only with decision of character can there be completion of a work.' These words sum up the case. . . .

"In modifying the government, the most important things to be considered are two: In the first place, the old customs were good, but, having been in operation a long time, a great many abuses and obstructions have grown up. The administration of the law should be thoroughly reformed and restored to its early condition. In the second place, what is lacking in the Chinese law should be supplied by an admixture of Western law, so that in time we may gradually become wealthy and strong. . . .

"The object of the establishment of this Board of Administration is to promote the independence of China. China's weakness is due to her poverty. The strength of foreign powers is due to their wealth. Deliverance from poverty, therefore, is the very beginning and foundation of independence. But the commencement of reform ought not by any means to wait upon the attainment of wealth. At present China has but a slender thread of life—merely the loyalty of her people; and at a time when bands of brigands are spread abroad, mutually deceiving and inciting one another, if the very first thing done is to search the Empire for money, it will shortly be said that of the thousand benefits promised and the hundred ills from which men are to be delivered, not one of the former has been gained nor one of the latter removed. Such a method is a direct oppression of the people and will alienate men's hearts. Though you may have very excellent plans, they will be difficult to carry out. But let us first remove one or two of the abuses complained of throughout the Empire, and carry into execution one or two of the things most desired, and we will cause the people of the whole Empire to know that the reforms projected by the court really have in view the promotion of the prosperity of the people and the removal of the ills from which they suffer. . . .

"In all matters let there be a purpose to search out the facts, and afterwards every edict issued will operate like running water. Heretofore, there have been debts to the foreign powers unpaid; now there is the pressure of the indemnity, amounting to more than 20,000,000 taels per annum. How are we to obtain such a sum? There are but two roads to wealth—one is to increase the revenues [literally, 'open the springs'], and the other is to economize in expenditure. An increase of the revenues will be either too gradual to meet the pressing demand, or it will be a case of 'seeking money and incurring odium.' This, therefore, is not so good as practicing economy in expenditure. Economy in expenditure means nothing else than the discharge of useless troops and the saving of their pay, the discharge of extra officials and the saving of their salaries, the abolition of useless offices and factories and the saving of the money spent on them. Pay for soldiers, official salaries, and other expenditures are all the very flesh and blood of the people of the Empire. . . .

"In the south and east certain provinces have begun the adoption of Western customs, and say there is nothing to fear or suspect in Western methods. But the people of the north and west are simple in their habits; their eyes and ears have had no broad experience, and to abruptly order them to change their manners is no wiser than the sounding of a cymbal for a deaf man to hear or the endeavor to peel a water nut with a lotus stem. In reforming the customs, therefore, it is decidedly difficult to make a plan of universal adaptability which may be put in operation among all the people of the whole

Empire. The plan must be adjusted to the character of the locality and developed according to the circumstances and prosperity of the people. Moreover, in adopting Western methods, we must remember that there are differences in Western forms of government and in Western industries.

"If we desire to obtain the material benefits of their civilization, we must first learn their hearts. The hearts of Western men are interested in the public welfare, while those of the Chinese, for the most part, are devoted to selfish concerns. . . . Thus naturally the two races are very unlike, and in endeavoring to adopt their civilization we get no more than the outside. Though ten thousand men should join together in the effort and labor through a hundred years, it would be very difficult to complete the transformation.

"From the first year of T'ung-chih (1862) down to the present, there has never been a time when we have not talked of foreign affairs. Institutions and factories have grown up like a forest, and ships and cannon have outnumbered the clouds; yet in thirty years what effective change has been completed? The reason for our failure is that while among Western people in their undertakings a thousand men are of one mind to secure the prosperity of the state—and securing the prosperity of the state benefits individuals as well—among the Chinese, in their affairs, a hundred men have a hundred minds, each seeking his own advantage, and while some profit and others do not, the state does not obtain the least benefit. It is for this reason that shares are not sold and that corporations are dissolved. In undertakings which the foreigner finds profitable, the Chinese, in their endeavors to imitate, find nothing but losses to make good. The hearts of the Chinese must first be rectified, and then they may imitate the excellent methods of the West; but to straighten the foundations and to cleanse the fountain, this is not a task for one man."

GEOGRAPHIC NOTES

TAHITI

THROUGH the courtesy of Mr. S. P. Langley the NATIONAL GEOGRAPHIC MAGAZINE is able to publish this month the diary of his recent trip to Tahiti. The diary is published as it was written from day to day, without any alterations, and is an entertaining story of several weeks passed in a fascinating part of the globe.

Tahiti was discovered in 1606 by Quiros, who named it La Sagittaria. One hundred and sixty one years later Captain Wallis rediscovered the island and called it after his sovereign King George. The native name, formerly spelled Otaheite, asserted itself, however, and is now alone used. Tahiti was Captain Cook's favorite center when exploring the Pacific. It was on this island he observed the Transit of Venus on his first great voyage of exploration in the Pacific. English missionaries settled in Tahiti near the close of the eighteenth century, and for some years met with considerable success. France declared a protectorate over Tahiti and the Society Islands in 1842, and in 1880 formally annexed the group.

LITERACY OF THE MEN OF THE UNITED STATES

THE most literate element of the male population of the United States is the native white of foreign born parents. Ninety-eight of every 100 men, 21 years of age or over, who were born in this country of white foreign parents can read and write. A less proportion of the native white of native parents read and write—94.2 per cent—while not quite nine-tenths of the foreign born men and only a little more than half of the colored men can read an addressed envelope or write a receipt. The following diagram shows the reading and writing ability of American men of voting age in each element. There are 21,329,819 males of voting age in the United States. Of this great army of men 19,003,524 read and write and 2,326,295 are capable of neither—that is, of the total male population who are of voting age in the United States 891 in every 1,000 are literate and 109 are illiterate.*

* See Census Bulletin no. 106.

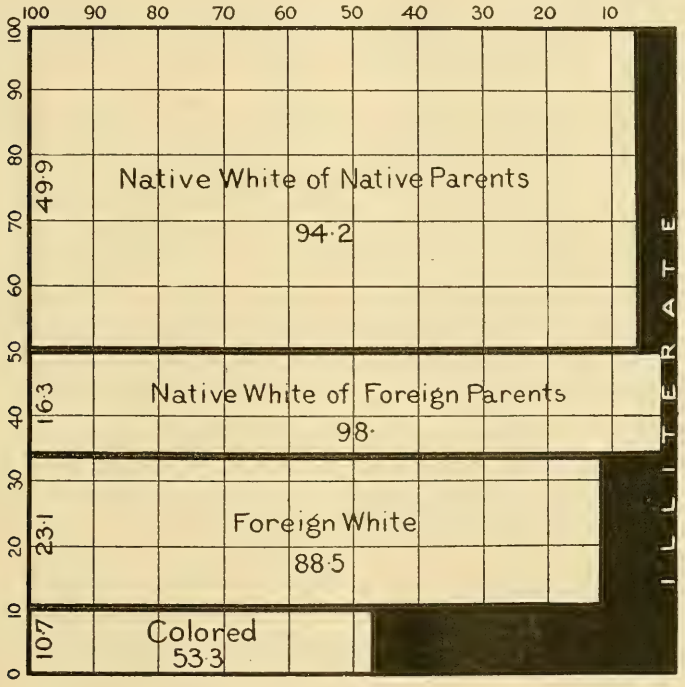
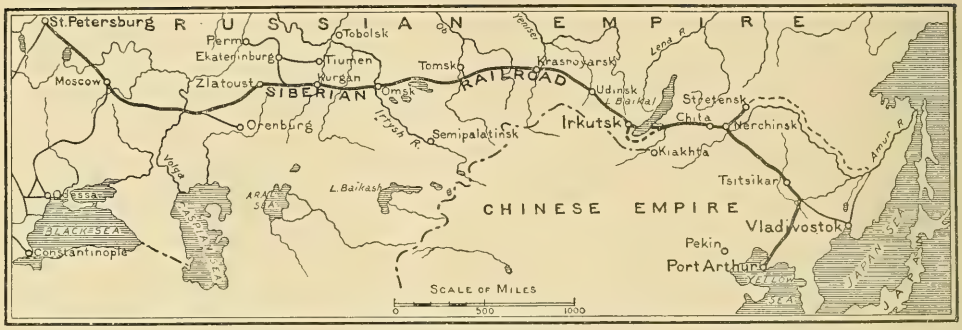


Diagram showing literacy of males 21 years of age and over in the different elements of the population

The diagram also shows the percentages of the different elements in the total male population that is 21 years of age and over



Outline Map showing route of Trans-Siberian Railway

TRANS-SIBERIAN RAILWAY

THE month of November marked the practical completion of the Trans-Siberian Railway. For Russia and Siberia the road has tremendous possibilities. It means to her vast Siberian territory the development and prosperity which the first belting of the American continent brought to the West. For Europe, especially western Europe, it means even more perhaps than to Russia. The road marks the inauguration of a new route to the Far East. The Siberian Railway will gradually supplant the Suez route, and make Russia, not England, the mistress of the world route to the Far East. An article that appeared in this Magazine in September, 1901, dwelt at length on the construction and meaning of this Trans-Asiatic railway. The Manchurian branch of the railway, with map, was described in the August, 1900, number.

ICE IN SOUTHERN LATITUDES

THE three expeditions now in South Polar regions will this season have to contend against ice extending more to the northward than usual. Mr. James Page, of the U. S. Hydrographic Office, sends to this Magazine the following paragraphs from the report of Capt. John N. Start, in command of S. S. *Star of New Zealand*, describing the icebergs seen during a voyage from Bluff, N. Z., to London:

"During passage passed icebergs as follows: September 6, 1901, latitude 53° 24′ S., longitude 142° 16′ W., passed a very large berg (over a mile long and over 600 feet high). Temperature of air, 37°; water, 41°. September 7, on the same parallel, between 140° W. and 135° W., passed 77 large bergs and numerous small ones, weather getting thick and dirty and ice very thick; kept ship off to N. N. E. September 8, latitude 51° S., longitude 131° 30′ W., passed 11 large bergs and numerous small ones. Air, 45°; water, 44. On the parallel of 50° 20′ S. and between 128° 30′ W. and 124° W. passed 10 large bergs and numerous small pieces. Temperature of air, 47°; water, 44°.

"Bergs were mostly of the table form, with sheer precipitous sides, showing clearly each stratum of snow in formation. In height they ranged from 370 feet to over 600 feet (height determined by sextant and distance). A number seemed of irregular shape, having been longer adrift and wasted by action of seas and heat. From the date last given no further ice was seen, the vessel making casting just north of the average ice-line shown on the chart.

"September 27, in latitude 20° S., longitude 30° W., between 6.30 and 7

a. m., we passed through a belt of whirlwinds 5 to 6 miles wide, extending to the horizon in either direction. Previous to this the wind had been blowing a moderately fresh breeze, varying from east to S. E., with rainy, dirty weather without any interval. The vessel passed into the belt. The whirlwinds were simply in hundreds and quite close to each other, so that the water was torn up into whirls in opposite directions every few feet, one blowing spray over the vessel on one side and another on the other side. The vessel passed out of the belt quite as suddenly into a fresh breeze from N. N. W. and the weather cleared up."

IN THE CANADIAN ROCKIES

A SUCCESSFUL exploratory trip was carried out last summer in the Canadian Rockies by Messrs. Henry G. Bryant and Walter D. Wilcox. The outfit consisted of fourteen pack and saddle horses, two experienced packers, and a cook, three tents and provisions sufficient to last two months.

Their main purpose was to explore and map a portion of the Rocky Mountains south of the Canadian Pacific Railway, between the Kootenai and Elk Rivers. This region is part of the main chain of the Rockies. It is about 75 miles long and from 25 to 30 miles wide, and had been hitherto unexplored, except for Captain Palliser's rapid journey over Kananaskis Pass many years ago.

The most important results obtained by Messrs. Bryant and Wilcox were the exploration and mapping of the upper part of the Palliser River and of the headwaters of several rivers flowing into the Elk, some important data about the Kananaskis Lake region, and the correction of errors in regard to the altitude and other details of the Kananaskis Pass. During the journey four passes were crossed and five large valleys explored, in the course of which a number of lakes and other interesting features were discovered, mountain ascents made, and a valuable series of photographs secured to illustrate the scenery and methods of travel. A small collection of fossils and stones was made for the benefit of geological knowledge of the region, and a set of panoramic views and roughly triangulated points will provide material for a new map of this very picturesque and interesting part of the Rockies.

An article by Mr. Wilcox, describing the work done and illustrated with maps and photographs, will appear in an early number of this Magazine.

The Population of the Argentine Republic now amounts to 4,800,000, of whom more than one-fourth, or 1,250,000, are foreigners. Four-fifths of the foreigners are from the Latin countries—Italy, Spain, and France. Buenos Aires, with a population of 829,891, ranks as the first city in the southern hemisphere and is the second city of Latin races in the world. A recent estimate gives the following figures:

Italians	635,000
Spanish	250,000
French	115,000
Orientals	60,000
Brazilians	15,000
English	28,000
Chileans	26,000
Germans	22,000
Russians	20,000
Swedes	20,000
Others	59,000
Total foreigners	1,250,000
Total natives	3,550,000
Grand total	4,800,000

Draining of the Zuider Zee.—United States Consul Hill, at Amsterdam, reports that the project for draining the Zuider Zee has been withdrawn indefinitely from the States-General by the new ministry. The condition of the Dutch budget is so low that it could not furnish the funds for such an expensive

work. Furthermore, the price of land in the kingdom has fallen, making new agricultural holdings undesirable.

Hon. Seth Low has resigned the presidency of the American Geographical Society of New York city. Mr. Low was elected president to succeed the late Judge Daly.

It is announced in the *Geographical Journal* that a magnetic survey of India is to be made by the Indian Government. In addition to the observatories at Bombay and Calcutta, others are to be built at Dehia Dun, Kodaikanal, and Rangoon. The work is to be directed by the Survey and Meteorological Departments jointly.

Colonial Administration is the title of a special report by Hon. O. P. Austin, Chief of the Bureau of Statistics of the Treasury Department, now in press and soon ready for distribution. Mr. Austin passed the earlier months of 1901 in the capitals of Europe studying the colonial departments of the European governments, and this important volume is the result of his researches and observations.

Not one case of yellow fever occurred in Habana during the month of October, the month during which the fever is most prevalent in Cuba. In October, 1900, there were 308 cases, of which 74 died. This remarkable change is the result of an untiring war on the mosquito, waged by the sanitary officers of Habana. Major Gorgas, chief medical officer of Habana, reports that no attempt was made to disinfect clothing or to enforce quarantine against the neighboring towns where yellow fever was active. Their only aim was to kill the mosquitoes that had bitten a sick person, and to prevent any more mosquitoes from biting after the case was discovered. There is today an immune population of about 40,000 persons in Habana, which yellow fever has ravaged for 150 years.

A Map of the territory of the Amazon has been prepared and published by Ermanno Stradelli. It is based principally on his own extended explorations in west central Brazil, east of Peru and Bolivia. Mr. Stradelli's work in this region has been very important, as he has ascertained the course of several large southern tributaries to the Amazon, and shown that their career is quite different from that hitherto given on South American maps. Mr. Stradelli's map is on the scale of about 32 miles to the inch.

The reciprocity treaties and agreements between the United States and foreign countries since 1850 is the subject of a very timely report issued by Hon. O. P. Austin, Chief of the Bureau of Statistics of the Treasury Department. The text of these treaties is given in full, and also the text of such treaties as have been negotiated and are awaiting action. The agreements awaiting ratification by the United States Senate are conventions with Argentina, the French Republic, Bermuda, Jamaica, British Guiana, and Barbados. This valuable bulletin may be obtained by application to the Bureau of Statistics.

The effects of the drought of July, 1901, upon the trade, industry, and commerce of the United States are admirably described by Dr. R. DeC. Ward, of Harvard University, in an article in the Bulletin of the American Geographical Society. One striking instance of the effect of the drought may be cited. The withering of the pasturage in the southwest compelled the stockmen to ship thousands of cattle to the markets weeks before they had planned. At Kansas City alone, during the month of July, 1901, 263,000 more head of cattle were received than in July of the preceding year. As a result the market was so overstocked that the buyers dictated prices.

Naturalized Foreigners in the United States.—Nearly two-thirds of the foreign born males of voting age in the United States are naturalized or have filed their first naturalization papers. There are about five million foreign born men (5,006,483) who are 21 years or over in the United States proper. Of these, 2,848,324 are naturalized, 412,513 have taken out their first naturalization papers, 1,001,124 have made no application to become American citizens, and the condition of 744,522 is unknown—that is, of every 1,000 foreign born males of voting age 569 are American citizens, 82 have taken steps to become American citizens, 200 are still aliens, and the condition of 149 is unknown.

The British Government has made arrangements to send its mail for Australia and New Zealand via the United States instead of by the present route down the Suez Canal, the Red Sea, and across the Indian Ocean. This announcement is made by George H. Daniels, general passenger agent of the New York Central. A fast steamer will convey the mail to New York, where it will be placed on a Pacific Coast express and connect with the Oceanic Steamship Company vessels at San Francisco. On an average, six or seven days will be saved in the passage to Australia. Doubtless Europeans bound for Australia will soon follow the mail. The time gained is a small advantage to the traveler compared to the comfort of passing the entire trip in a cool climate instead of sweltering on a slow steamer on the Red Sea and Indian Ocean.

The completed report of the Isthmian Canal Commission differs but slightly from the preliminary report of the Commission, an abstract of which, with map, appeared in the January, 1901, number of this Magazine. The Commission, as before, favor the Nicaragua route, estimating that the canal by this route would cost $63,500,000 less than the sum for which the Panama property can be purchased and the canal completed. The final surveys have shortened the proposed Nicaragua route three miles, and have enabled the Commission to plan for eight locks instead of nine. The entire distance is now 183.66 miles, of which 73.78 miles are of the canal proper, and the remainder lake and river. The total cost is estimated at $189,000,000, which is $11,000,000 less than the amount previously reported. This large sum saved is because the engineers have discovered a better site for the gigantic dam that must be built to regulate the level of Lake Nicaragua.

Territorial Expansion of the United States.—The additions made to the thirteen original colonies and the transformation of this territory into separate territories and states is admirably described in a recent useful report by Hon. O. P. Austin. Mr. Austin has shown the different changes in state and territorial boundaries by a series of diagrams. For instance, diagram No. 7, 1803, presents the Louisiana Purchase as one province; No. 8, 1804, shows the province divided into the Louisiana District and the Territory of Orleans; No. 10, 1810, shows the Orleans Territory admitted as the State of Louisiana, and the Louisiana Territory changed in name to the Territory of Missouri. The successive breaking up of the Territory of Missouri into the Territory of Arkansas and the State of Missouri, and all following changes are graphically shown. The diagrams form a series of moving pictures of the rapid changes in the boundaries of our fifty odd states, territories, and possessions.

The Military Information Division of the War Department will publish within a few weeks a comprehensive report on the colonial armies of the great powers.

GEOGRAPHIC LITERATURE

*Alaska: Volume I, Narrative, Glaciers, Natives. By John Burroughs, John Muir, and George Bird Grinnell. Volume II, History, Geography, Resources. By William H. Dall, Charles Keeler, Henry Gannett, William H. Brewer, C. Hart Merriam, George Bird Grinnell, and M. L. Washburn. New York: Doubleday, Page & Company. 1901. [Superimprinted] Harriman Alaska Expedition, with the coöperation of the Washington Academy of Sciences. [Edited by Dr. C. Hart Merriam.] With 39 colored plates, 85 photogravure plates, 5 maps, and 240 text figures. Pp. xxxvii, 383. $15.00

One of the handsomest pieces of bookmaking ever produced has recently appeared in the form of a report on the Harriman Alaska Expedition. The two sumptuous volumes are models in such matters as typography, paper, binding, and the like; they are unique, at least so far as solid scientific literature is concerned, in certain matters of execution, such as the neat loose covers matching the permanent binding; the numerous color-plates touch a new apex in the triangular ideals of fidelity to nature, strength of expression, and refinement in line and tone; the photogravures are unexcelled examples of that mode of picturing which was last century's richest gift to art, while the text cuts are at once germane, graphic, and artistic. The first impression produced by the book is that it is a thing of beauty.

The body of the work begins with John Burroughs' narrative of the expedition. It is a novel chapter in the history of expeditionary enterprise. The family would go a-touring; the head thereof would have the tour instructive; so the family was temporarily enlarged to a ship-load of congenial folk, including a "scientific party" of 25 eminent savants who were to breathe out the instruction. Then, to tempt the grave and reverend seigniors, as well as to give zest to the lessons, provision was made for research along new lines—for actually augmenting the sum of human knowledge—and a corps of artists, photographers, stenographers, and doctors was added, together with officers and crew of the good ship *George W. Elder*. The full outfit aggregated 126 persons, with such facilities and supplies that when all was done (with the milch cow left over) and the party debarked, the faithful poet-scribe jotted the feeling that all "had traveled far and fared well" ere he dropped his pen. Yet, before reaching this mild benediction, he drew one of the most telling word pictures of geographic journeying ever done in this land of magnificent distances. The enthusiastic glacialist, John Muir, follows Burroughs with a memoir on "Pacific Coast Glaciers," and the versatile editor of *Forest and Stream*, Dr. George Bird Grinnell, describes the "Natives of the Alaska Coast Region." Both of these contributions represent the results of previous researches, as well as those of observations made during the expedition; and the legion of new-found and newly christened glaciers receive special attention. The second volume opens with a succinct account of discovery and exploration in the territory by the veteran Alaskan, Dr. W. H. Dall; Dr. Charles Keeler describes the birds, and Prof. Bernard E. Fernow discusses the forests; Henry Gannett follows with a summary of Alaskan geography, already printed in this Magazine, while Prof. William H. Brewer discusses the peculiar atmos-

* "The General Geography of Alaska," by Henry Gannett, one chapter in this remarkable work, was published in full in the May, 1901, number of this Magazine.

pheric effects of Alaska; Dr. Merriam describes "Bogoslof, our newest Volcano," and Dr. Grinnell and M. L. Washburn, respectively, summarize the salmon industry and the fox farming of our remote commonwealth—and more strictly literary features attest the inspiration of a trip in which the prosaic and the poetic were so happily blent. Naturally, in view of the eminent authorship, the several chapters are notably authentic and trustworthy; and the whole must long serve as the standard source of general information concerning the vast territory just entering on a promising career of industrial, commercial, and social development. Nor are these two volumes all; for additional chapters, prepared through the coöperation of the Washington Academy of Sciences, are to follow so soon as the material is elaborated

The work is a notable one in plan and scope, and in the combination of utility and beauty displayed by the volumes—indeed, such are its excellencies that the chief imperfections readily detected are merely (1) insufficient recognition of the editorial labors, and (2) the absence of a trenchant title—for, despite an acceptable title-page caption the full titles are unlike, and the name on the back is that of the expedition and not that of the book.

W J M.

'Twixt Sudan and Menelik. By Capt. M. S. Wellby, with many illustrations and two maps. New York: Harper & Bros. 1901.

There is an art of travel in wild countries; an art made up of all sorts of applied knowledge—physiology, medicine, engineering, cooking, shooting, and human sympathy. Of this art Captain Wellby was a master, and a greater master, I think, than would be suggested by his book, save to those who have had some experience similar to his own. There is no systematic attempt to teach his art, nor is there indeed any systematic presentation of the results of a very notable journey through unknown regions. The author explains that preparation for service in South Africa followed fast upon his return from the Sudan. There was thus but little time for the sifting and arrangement of the very large mass of material which must have been obtained by a traveler of such experience and intelligence.

Yet all who are interested in African exploration must rejoice that fate permitted the making of this straightforward story before carrying its author to an heroic death on the veldt. In the book one finds something of that oversupply of detail which mars nine-tenths of all the books of travel. Yet happily Captain Wellby had an instinctive elective faculty which gives to the greater part of even the trivial recitals a value either for the stay-at-home or for other wanderers. Indeed, for the traveler, some hints may be taken from almost every page. And the chief lesson is perhaps this: that kindness of heart and sweet charity are not thrown away when shown toward black Africans. Nay, not more than if shown to your own friends. A less sympathetic man, a man less truly brave than Captain Wellby, might have recounted more of startling adventure and less of instruction.

The most valuable portion of the book is, of course, that dealing with the journey from Addis Abeba to the White Nile, since the route from Zeila to Addis Abeba is already well known. Captain Wellby's narrative has much importance as bearing upon the country and peoples met as one travels southwestwardly from Menelik's capital. Intertribal feuds and Abyssinian raids may seriously change the locus, the numbers, even the views, of several small tribes whose present habitat had never, before Captain Wellby's appearance, known the white man's presence. This first record is therefore of spe-

cial importance to the student of primitive man. A suggestion of the varied experiences met with in the journey through the Lake Rudolf (or Gallop) region and the country lying to the west of the lake is had in reading the list of the names of tribes, many of them unknown, none of them well known. Thus, Arusi Galla, Walamo, Alibori, Wangobeino, Gallopa, Lokub, Turkana, Loka, Abbas, Tamata, Boma, Morelli, Shillaks, and Dinkas. Of these the Walamo are noteworthy for their alleged and widely credited power of bewitching with devils. The Turkana are remarkable for their great size. Captain Wellby puts a higher estimate than most travelers upon the capacity of the Abyssinian character in respect to the higher emotions—friendship, charity, generosity—the very qualities which would be most readily developed by his own lovable nature. One is permitted to doubt the author's prediction that most of their present defects will be largely cured by intercourse with Europeans. In using well-established native names of lakes and rivers, rather than those proper names of European travelers assigned for glory's sake, Captain Wellby administers a reproof to vanity. The general reader of this important book will inevitably feel a sympathetic interest in its author. The graceful introduction and epilogue, written respectively by his friends Colonel Harrington and Sir Rennel Rodd, will pleasantly gratify this interest. Many good photographs and two maps add to the value of the text.

OSCAR T. CROSBY.

Animals of the Past. By F. A. Lucas. With many illustrations. New York: McClure, Phillips & Co. $2.00.

Mr. Lucas has given the public a book that has long been needed, an authoritative but simply written account of the strange animals of past ages. In a chapter on the "Rulers of the ancient seas," the author sketches the successive races of creatures who ruled the oceans long before the advent of man. "For a time the armor-clad fishes held undisputed sway; then their reign was ended by the coming of the sharks, who in their turn gave way to the fish-lizards, the Ichthyosaurs and Plesiosaurs." Then came great marine reptiles, who extended their empire from New Zealand to North America, the Mosasaurs. These maintained their headquarters in the oceans that rolled over western Kansas. As this great plain in the course of hundreds of centuries was gradually lifted, they were imprisoned, the weaker captured by the stronger, and in time even the latter were strangled by the freshening of the water or starved by the disappearance of their food supply. Then sharks came into power again, small sharks with little teeth and great sharks with gaping jaws six feet across and inside hundreds of gleaming teeth, three, four, and five inches long. These enormous sharks swarmed everywhere that the water was warm, and then they disappeared utterly. Chapter headings of the volume are as follows: "Fossils and how they are formed," "The earliest known vertebrates," "Impressions of the past," "Rulers of the ancient seas," "Birds of old," "The Dinosaurs," "Reading the riddles of the rocks," "Feathered giants," "The ancestry of the horse," "The mammoth," "The mastodon," "Why do animals become extinct?"

Our National Parks. By John Muir. With illustrations. New York: Houghton, Mifflin & Co. $1.75.

The magnificence of scenery of the western United States and what is being done to preserve it by reservations like the Yosemite and Yellowstone National Parks is the theme of this volume. Mr. Muir says his aim in writing the series of sketches has been to incite people "to come and enjoy them [the national parks] and get them into their hearts,

that so at length their preservation and right use might be made sure." The following paragraph, quoted from Mr. Muir, describes the rapid change that has taken place by the hand of man:

"Only thirty years ago, the great Central Valley of California, five hundred miles long and fifty miles wide, was one bed of golden and purple flowers. Now it is ploughed and pastured out of existence, gone forever,—scarce a memory of it left in fence corners and along the bluffs of the streams. The gardens of the Sierra, also, and the noble forests in both the reserved and unreserved portions are sadly hacked and trampled, notwithstanding the ruggedness of the topography,—all excepting those of the parks guarded by a few soldiers. In the noblest forests of the world, the ground, once divinely beautiful, is desolate and repulsive, like a face ravaged by disease. This is true also of many other Pacific Coast and Rocky Mountain valleys and forests. The same fate, sooner or later, is awaiting them all, unless awakening public opinion comes forward to stop it. Even the great deserts in Arizona, Nevada, Utah, and New Mexico, which offer so little to attract settlers, and which a few years ago pioneers were afraid of, as places of desolation and death, are now taken as pastures at the rate of one or two square miles per cow, and of course their plant treasures are passing away,—the delicate abronias, phloxes, gilias, etc. Only a few of the bitter, thorny, unbitable shrubs are left, and the sturdy cactuses that defend themselves with bayonets and spears."

Commercial Geography. By Cyrus C. Adams. With illustrations and maps. New York: D. Appleton & Co.

In breadth of treatment and systematic plan this book is equaled by no commercial geography yet published. Mr. Adams is an eminent expert on the editorial staff of the New York *Sun* and has spent many years studying the problems of commercial geography. He has successfully aimed in the present volume to keep constantly before the reader the geographic influences affecting commerce. Very few statistics are given, their place being taken by diagrams and charts. Instead of grouping the different products under the traditional heads of animal, vegetable, and mineral commodities, Mr. Adams has treated each product in connection with that country in whose commerce it is most prominent. For instance, cotton is discussed under the United States, which produces three-fourths of the raw cotton of the world.

The book is written in a simple and entertaining style that commends it to every one. The volume is especially fortunate at the present time, when the people of the United States are thinking about and studying the problems of commerce as perhaps they have never done before. One who wishes to refresh his mind as to what the different nations have to offer each other could not do better than read Mr. Adams' "Commercial Geography." The one criticism that might be offered of this scholarly work is that the value of the book suffers because it contains no references of places where the general reader may look for further information. A brief bibliography would add immensely to the convenience of the book.

Seen in Germany. By Ray Stannard Baker. With illustrations. New York: McClure, Phillips & Co. $2.

This is an interesting sketch of German life among all classes. A chapter gives an account of the German workingman—of his daily life, his wife, his food, his problems, and his relations with his government. The German workingman is supposed to work 11 hours a day and often longer, and for his long day receives from one-third to one-half the wages of an American, work-

ing only eight hours of the twenty-four. Mr. Baker states that wages have risen nearly 33 per cent in the last fifteen years, but this gain has been outbalanced by doubling in cost of food. He makes the startling statement that the staples of food actually cost the German more than they do the American; so that he never thinks of buying butter, milk, eggs, or white flour, which the American would consider absolute necessaries. The government keeps a fatherly eye over the workingman, sees that his bread is rightly made, and that he makes provision for his old age. The result of this paternal care, in Mr. Baker's judgment, is greater efficiency in work, but not in the mental development of the workman.

The New Basis of Geography. By Jacques W. Redway. New York: The Macmillan Co.

This volume, written by a well-known writer and lecturer on geographic subjects, is designed to give teachers a broad interpretation of geography, more particularly of the "relations between human activities and geographic environment." It emphasizes the fact that "man and nature, man in nature, not man alone, or nature alone, are the true subjects of interest and of study in geography." It is a very suggestive and stimulating book, and is unhesitatingly recommended to all students of geography.

Armenia—Travels and Studies. By H. F. B. Lynch. Two vols. With many colored illustrations and maps. Longmans, Green & Co. $15.

Mr. Lynch describes two journeys in Armenia, the first extending from August, 1893, to March, 1894, and the second from May to September, 1898. The first volume deals with the Russian provinces, the second with the Turkish. Mr. Lynch describes the commercial prosperity and the obedience to law which has been the result of the Russian rule. Erivan is an instance of a small and sleepy town springing into a prosperous commercial center under Russian occupation. Unfortunately, however, says Mr. Lynch, the Russian Government has not confined its energies to maintaining public order, but has sought to regulate the Armenian schools, and has thus almost stifled education. "The result is the Armenian must sink his individuality and resign his initiative into Russian hands." In the Turkish provinces conditions are very bad; the Armenian is badgered and tortured by the Kurd, and neither his life, house, or shop is safe.

The volumes present an immense amount of information—geographical, political, and historical The numerous maps and illustrations are beautifully engraved. An exhaustive bibliography and comprehensive index complete this valuable work.

The Insect Book. By Dr. L. O. Howard. With many illustrations. New York: Doubleday, Page & Co. $3.

The Insect Book will be prized by the amateur who in spare moments takes delight in making collections and in studying insect life. Dr. Howard has aimed "to encourage the study of life histories of insects," and, wherever possible, gives a typical life history of each family. He tells not only what is known, but also what is not known, but which can be more or less easily found out. The book is handsomely illustrated from photographs of insects.

Europe and the Other Continents. By R. S. Tarr and F. N. McMurry. New York: The Macmillan Co. $0.75.

Professors Tarr and McMurry are experienced and successful teachers of geography, and are thus able to write a geographic text-book containing the most important facts that a pupil should learn. A special feature of the volume

are 435 colored maps, diagrams, and charts that present in graphic and terse form much information for which there would otherwise be no space. This is the third volume in the series of Tarr and McMurry's Geographies.

The Great Deserts and Forests of North America. By Paul Fountain. Longmans, Green & Co. $3.75.

The volume consists of a series of rambling but entertaining notes of the author's travels in the western United States, for the most part made some thirty years ago. The title is misleading, for the book is in no sense descriptive of what its name implies.

Australia—The Commonwealth and New Zealand. By Arthur W. José. New York: The Macmillan Co. $0.40.

The author lived for seventeen years in the four colonies of eastern Australia, and speaks with an intimate knowledge of his subject. In this little volume of 150 pages he gives a summary of the exploration, development, and experiments at self-government in the island continent and in New Zealand.

In the Ice World of the Himalaya. By Fanny Bullock Workman and William Hunter Workman. With maps and illustrations. New York: Cassell & Co. $4.00.

"In the Ice World of the Himalaya" is the modestly told story of record climbing among the great peaks of the Himalaya. Mrs. Workman is the champion woman mountain-climber of the world, but speaks as modestly of reaching the summit of Koser Gunge, 21,000 feet, or Mount Bullock Workman, 19,450 feet, as though she were walking down Fifth Avenue. As the authors very truly remark, mountain-climbing in the Himalaya is quite different from mountaineering in Switzerland and the Tyrol. Instead of hotels and villages within a few hours distance, and shelter-huts and a corps of guides, the mountaineer in the Himalaya must march many days beyond even the last semi-civilized village, and then fight his way up the mountain handicapped by coolies whom he must coax and bully along. A number of excellent pictures from photographs give a graphic idea of the great peaks.

The Highlands of Asiatic Turkey. By Earl Percy, M. P. New York: Longmans, Green & Co. $3.75.

Earl Percy gives the record of a journey in 1899 through Asia Minor from Constantinople to Busra, on the Persian Gulf. Two detail maps of the country are published. There is much information in the volume, but presented in a somewhat heavy manner. There is the usual plaintive chapter appealing to the British Government to wake up and take a definite policy in western Asia.

The Bureau of Forestry has published "Notes on the Red Cedar," by Charles Mohr (Bul. No. 31), and "Practical Forestry in the Southern Appalachians," by Overton W. Price. The former contains a map showing the present distribution of red cedar in the United States. The densest growth of cedar is in Tennessee, west Florida, and central Alabama, while west of the 101st meridian there is none at all. Mr. Price explains the growing need of systematic forest management in the southern Appalachians, and makes a number of practical suggestions.

The great industrial depression in Germany, which has rendered idle more than one-fourth of her workingmen, is the subject of a special report by the U. S. consul general at Berlin, Frank H. Mason (Consular Reports, November 9, 1901, No. 1185).

The Chinese protocol, signed September 7, 1901, is published in full in the Consular Reports for November 5 (No. 1180).

NATIONAL GEOGRAPHIC SOCIETY

PROCEEDINGS

MEETINGS OF THE SOCIETY:

November 1, 1901.—Vice-President McGee in the chair.

A paper by Dr. Angelo Heilprin, of Philadelphia, advocating the establishment of a "National Geographic Institute" at Washington, was read by the Secretary. The paper was referred for consideration to a committee consisting of Wm. H. Dall, A. J. Henry, and R. U. Goode. Further notice of the paper will be made later.

Gilbert H. Grosvenor, A. M., gave a brief address on the "Geographic Societies of Europe and America," more particularly of those on the former continent. The Vice-President in an eloquent address explained why the study of geography appeals to the intellect and heart of men.

November 15.—Vice-President McGee in the chair.

Dr. Marcus Baker read a paper on "The Lost Boundary of Texas," an abstract of which appears on page 430 of this Magazine.

LECTURES:

November 8.—Vice-President McGee in the chair.

Dr. F. H. Wines, Assistant Director of the Census, opened the course of lectures presented by the Society this season by an address on "The Twelfth Census." Further notice of this lecture will be made later.

November 22.—Vice-President McGee in the chair.

Mr. Herbert L. Bridgman, Vice-President of the Arctic Club, gave an illustrated address on "Peary's Work and Progress during the Past Two Years." Mr. Bridgman exhibited a map prepared by Peary as a result of his work in 1900, showing in detail the northern coastline of the Greenland Archipelago. The worn character of the north coast, similar in character to the north coast of Grant Land, on the other side of Robeson Channel, showed unmistakably that the northern sea was a vast ocean, probably extending to the Pole itself. The map will not be published until Mr. Peary returns to the United States.

ANNOUNCEMENTS

POPULAR LECTURES:

December 6.—"The Interior of Borneo;" Prof. A. C. Haddon, Oxford, England.

The natives of Borneo were the object of study of an expedition dispatched to the island from England in 1898–1899. As leader of this expedition, Professor Haddon obtained much interesting information about the peoples and country of the little-known interior.

December 20.—"The Trans-Siberian Railway;" Hon. E. J. Hill.

As a member of important committees in the House of Representatives, Mr. Hill has taken a practical interest in the extension of American influence, and has just returned from the Orient over the Trans-Siberian Railway. His journey gave opportunities for observations of much interest, which will receive first announcement through the Society.

January 3, 1902.—"The New Mexico;" Hon. John W. Foster, ex-Secretary of State.

General Foster was United States minister to Mexico during the years 1873–1880, when the Republic was just starting on that phenomenal career of development which raised it to a prominent position among nations and placed its president among the world's great leaders. Twenty years later (in 1901) he revisited the country as its guest, and his observations and impressions will form the theme of his lecture.

January 17.—"American Progress and Prospects in the Philippines;" Gen. A. W Greely, Chief Signal Officer, U. S. Army.

General Greely has returned to America after an extended tour among the Philippine Islands. As an example of American progress in the Philippines, it may be stated that 6,000 miles of telegraph lines and cables have been put up in these islands by the U. S. Signal Corps in the three years since the capture of Manila. Telegraph and cable connections are now complete between the northern coast of Luzon and Jolo, 1,000 miles to the south.

MEETINGS OF THE SOCIETY:

December 13, 1901.—"The Northwest Boundary;" C. H. Sinclair, U. S. Coast and Geodetic Survey; E. C. Barnard, U. S. Geological Survey; Bailey Willis, U. S. Geological Survey.

December 27.—Holiday vacation.

January 10, 1902.—Annual meeting, reports and elections.

INDEX

Page

Abruzzi, Arctic expeditions of Duke of 44, 203, 204, 247, 380
Abydos, Excavations at 396
Abyssinia—The country and people; Oscar T. Crosby 89
—, Geography of 274
—, Long-distance telephone in 96
—, Review of book on modern 274, 444
—, Slavery in western 98
Adams, C. C., Review of book by 445
Africa, Explorations in 148
—, central east, Explorations in 42
African language in Jamaica 164
Agricultural exports of United States 380
Alaska, Explorations in 206, 399
—, Forests of 193
—, General geography of; Henry Gannett 180
—, Narrative of Harriman expedition to 199, 442
—, Population of 193
—, Telegraph system of 6
Alexander, E. P., cited on boundary between Nicaragua and Costa Rica 23
Alexandrowsk, Arctic harbor 83
America and China 269
—, List of maps of 409
—, Origin of the name of 326
American Republics, Bureau of, Work of 247
— floating exposition; O. P. Austin 49, 204
— interests in Manchuria 270
— progress in the Philippines 405
Amur, Finding of the mouth of 318
Andorra, Republic of 169
Animals of the past 444
Anschütz-Kampfe, inventor of Arctic submarine boat 201
Antarctic expedition, British 47, 203, 339
— —, German 47, 203, 311, 341 377
— —, Scottish 204
— —, Swedish 204, 406
Arc of Quito, Remeasurement of 316
Arctic currents, Testing of 404
Arctics, Work in, in 1901 ..... 82, 202, 280, 357, 380
Argentine Republic, Population of 438
Asia, Arid closed basin of 253
—, central, Explorations in 393, 405
—, cradle of humanity; W J McGee 281
—, Culture stages of 284
—, Distribution of cities of 251
—, Faunal divisions of 262
—, Floral bounding culture regions of 261
—, Human antiquity in 289
—, Races of 282
—, Rainfall and development of 256
—, southwestern, Link relations of; Talcott Williams 249, 291
—, World's debt to 290
Athens, Geological explorations near 401
Atlantic weather service 81
Atmosphere surrounding the earth, Depth of 406
Austin, O P.; An around the world floating exposition 49, 204
—, Reference to work of 79, 204, 440, 441
Australia, Explorations in 145
—, Glacial action in 161
—, Population of 241
—, Transcontinental railway of 313
Austria-Hungary, Population of 205

Bailey, Vernon, Biological work by 247
Baker, Marcus, Gazetteer of Alaska by 409
—; Lost boundary of Texas 430
—; Kodiak, not Kadiak 397
—, Record of address by 448
— referred to 352
Baker, R. S., Review of book by 445

Page

Baldwin-Ziegler North Polar Expedition. 82, 202, 280
Balloons as an aid to exploration 347
Barnard, E. C., Record of address by 128
—, Work on northwestern boundary by 162
Barrett, John; China: her history and development 209, 266
—, Record of address by 283
Bathymetrical survey of freshwater lakes of England 408
Baum, Indian village of 272
Behaim, Martin, Globe of 325
Bell, Alexander Graham, referred to 351
Bell, Robert, Director of Geological Survey of Canada 206
Bickerton, A. W., Review of book by 166
Bigelow, Frank H., Record of address by 127
Biological Survey, Expeditions of 206, 247, 405
Bolivia, Chile's dispute with 401
—, Geographic work in 244, 406
Boundary between Brazil and French Guiana, Location of 83
— — Nicaragua and Costa Rica, Location of 22
— of Texas 429
— surveys in the United States 106, 373, 409
—, Work on northwestern 161
Boxers, Revival of the 57, 271
Brazil-French Guiana boundary decision 83
Bridgman, H. L., Letter from Peary to 358
—, Member of Peary relief party 280
—, Record of addresses by 166, 448
—, Telegram from 357
British Pacific cable 3, 78
— South Polar Expedition 47, 203, 339
— Yukon telegraph 164
Brooks, A. H., Work in Alaska by 399
Brown, H. C.; The Indian village of Baum 272

Cable, British Pacific 3, 78
— equipment of a fleet 10
—, Survey for a Pacific 48
— system of Great Britain 3
Cables, German submarine 163
—, New French ocean 315
—, Submarine, Influence upon military and naval supremacy of 1
—, West Indian 10
California, Oil fields of 276
Canada, Early explorations in 146
—, Population of 347
—, Unexplored 243
Canadian Rockies, Explorations in 439
Cape to Cairo telegraph 162
Carnegie Museum, Field workers from 311
Caves, Ice 433
Central America, Germany in 201
Century Atlas of the World 126
Chalmers, James, Massacre of 316
Channel Indians 20
Chart of the world 38
Chile's dispute with Peru and Bolivia 401
China and America 269
— — Japan; some comparisons; Harrie Webster.. 69
—: Her history and development; John Barrett 209, 266
—, Military operations in 409
—, Powers in control of 78
—, Reforms in 434
—, Relations with the Romans of 216
—, Review of book by James Harrison Wilson on.. 207
—, Revival of the Boxers in 57
—, The coming and expulsion of Christianity in... 215
—, Western progress in 434
Chinese in the United States 388
—, Recuperative character of 211
Clark, J. H., Survey of Texas boundary by 430
Cleveland, Grover, referred to 23

Page

COAL, Output of, in the United States..... 348
COAST AND GEODETIC SURVEY, Work of..... 36, 158, 161, 207, 405
COLD-WAVE warnings..... 365
COLOMBIA, Revolutionary movements in..... 172
COLONIAL Administration, Report on..... 440
CONGER, Minister, referred to..... 59, 434
CONSULAR list of the United States..... 315
CONWAY, SIR MARTIN, Expedition sent by..... 406
COOK, FREDERIC A., Record of address by..... 166
COSTA RICA and Nicaragua, Boundaries between.. 22
COVILLE, F. V., Record of address by..... 127
COW-WORSHIPPERS among the Magois (Africa)..... 43
CRANE, ALICE ROLLINS; The midnight sun in the Klondike..... 66
—; The northern lights..... 69
CROSBY, OSCAR T.; Abyssinia—The country and people..... 89
—, Book review by..... 444
—, Record of address by..... 127
CUBA, Census of..... 80
—, Telegraph system in..... 5
—, Work by Geological Survey in..... 207

DAMASCUS and Mecca Railway..... 408
DARTON, N. H., Record of address by..... 127
DAVIDSON, GEORGE; Origin of the name "Cape Nome"..... 398
DAVIS, ARTHUR P.; Location of the boundary between Nicaragua and Costa Rica..... 22
—, Record of address by..... 88
DAVIS, WM. M., Referred to..... 352, 409
DAWSON, GEORGE M., Obituary note on..... 197
—, Work in Yukon watershed by..... 146
DAY, DAVID T., Chart compiled by..... 407
—, cited on oil fields of Texas and California..... 276
DEATH rate in the United States..... 401
DE MORGAN, Excavations at Susa of..... 315
DENMARK, Population of..... 205
DESERT STORM..... 125
DIKES of Holland, The; Gerard H. Matthes..... 219
DRIFT of floating bottles in the Pacific Ocean; James Page..... 337
DRYGALSKI, ERICH VON, Leader of the German Antarctic Expedition..... 47, 204, 331, 378
DU CHAILLU, PAUL, Referred to..... 208, 315
DUMONT, SANTOS, Success in aerial navigation referred to..... 347

EGYPT, Recent discoveries in..... 396
EMORY, FREDERIC, Report on foreign commerce by..... 244
EMORY, W. H., cited on southern boundary of the United States..... 376
ERIVAN, Old post-road from Tiflis to..... 300
ETHNOLOGIC expedition to Santo Domingo..... 130
ETHNOLOGY, BUREAU OF AMERICAN, Work of..... 369
EVANS, JONES W., Leader of Conway's Bolivian expedition..... 406
EXCAVATIONS at Abydos..... 407
— at Susa..... 315
— near Athens..... 407
EXPOSITION, An American floating..... 49, 204
—, An Austro-Hungarian floating..... 164
EXPLORATIONS during nineteenth century..... 143
— in Alaska..... 399
— — central east Africa..... 42
— — Victoria's reign..... 160

FILIPINOS, Amusements of..... 121
—, Tools and weapons of..... 120
FIRE-WALK at Tahiti..... 425
FISH and Fisheries, U. S. Commission on, Work of. 404
FLINDERS-PETRIE, Excavations by Prof..... 396
FLOOD warnings in United States..... 367
FORBES, R. H., referred to..... 104, 130, 145
FORD, ALEXANDER HUME, Record of address by.. 166
FORREST, JOHN, Australian railway scheme of..... 313
FOSTER, JOHN W., cited on Mexico..... 159
—; The Latin-American constitutions and revolutions..... 169

Page

FRANKENFIELD, H. C., Record of address by... 88, 127
FRANKLIN, JOHN, Arctic explorations of..... 144
FREMONT, JOHN C., Explorations of..... 146

GADSDEN Purchase..... 106, 377
GANNETT, HENRY; General geography of Alaska 180
—; George M. Dawson..... 197
—; Origin of Yosemite Valley..... 86
—, referred to..... 80, 199, 241, 314, 373, 388, 400, 409
GEIKIE, ARCHIBALD, Obituary note on..... 163
GENTHE, MARTHA KRUG; German geographers and German geography..... 324
GEOGRAPHIC facts from report of the Taft Philippine Commission..... 114
— literature..... 126, 165, 207, 248, 409, 442
— names, Decisions regarding..... 87, 125, 200, 242, 316
— notes..... 44, 77, 123, 158, 199, 240, 313, 347, 380, 399, 436
— progress in South America..... 244
GEOGRAPHIC SOCIETY, NATIONAL, Proceedings of. 88, 127, 166, 208, 447
— — —, Program of..... 411
GEOGRAPHICAL Congress, International..... 351
GEOGRAPHICAL Society, Imperial Russian..... 405
— — of Vienna..... 201
— —, Royal..... 101, 160
— Societies of France, Congress of..... 404
GEOGRAPHY, Certain persistent errors in..... 400
—, Elementary teaching in Germany of..... 333
GEOLOGICAL explorations near Athens..... 407
GEOLOGICAL SURVEY, Work of... 206, 246, 314, 348, 399
GERDINE, T. G., in charge of Alaska expeditions..... 206, 399
GERMAN census, The..... 123
— geographers and German geography..... 324
— South Polar expeditions..... 47, 203, 311, 377
— submarine cable system..... 163
GERMANY in Central America..... 201
—, Suspension railway in..... 162
GILBERT, C. H., Reference to deep-sea work by..... 404
GILBERT, G. K., Record of address by..... 88
GLACIAL action in Australia..... 161
GLOTOF, STEPHEN, Discovery of Kodiak by..... 397
GREAT BRITAIN, Cable system of..... 3
— — in Yangtze valley..... 163
— —, Population of..... 249
GREECE, Survey of..... 206
GREELY, A. W.; Advances in geographical knowledge during the nineteenth century..... 143
—, Record of address by..... 88
— referred to..... 8, 247, 352
GROGAN, EWART S., Record of address by..... 88
GROSVENOR, EDWIN A., Record of address by..... 166
— referred to..... 283
—; Siberia..... 317
GROSVENOR, GILBERT H., Book reviews by.... 126, 165, 207, 248, 409, 444
—; Geographic notes..... 44, 77, 123, 158, 199, 240, 313, 347, 380, 399, 436
—; Next international congress to be held in Washington..... 351
—, Record of address by..... 448
—; Sex, nativity, and color of the people of the United States..... 381

HAARLEM Lake, Draining of..... 224
HAECKEL, ERNEST, referred to..... 286
HARRIMAN Expedition, Narrative volume of.. 199, 442
— — referred to..... 181
HARTI, HEINRICH, Survey of Greece by..... 206
HATCHER, J. B., Field-work of..... 311
—; The Indian tribes of southern Patagonia, Tierra del Fuego, and the adjoining islands..... 12
HAY, JOHN, referred to..... 269
HEDIN, SVEN, Explorations in Central Asia..... 45, 147, 393
HEILPRIN, ANGELO, Record of address by..... 448
HENRI OF ORLEANS, Obituary note on..... 346
HENRY, A. J., Record of address by..... 127
— referred to..... 81, 82, 248, 448
HILDER, F. F., Work in the Philippines of..... 119
—, Obituary note on..... 85
HIGH plains and their utilization..... 409

Page

HITCHCOCK, FRANK H., Report of..... 380
HODGE, F. W., Book review by 165
HOFFMAN, D. O. NOBLE; The Philippine exhibit at the Pan-American Exposition..... 119
HOLDER, CHARLES F.; A remarkable salt deposit.. 391
HOLLAND, The dikes of; Gerard H Matthes..... 219
—, Means of protection against flood discharges in.. 231
—, Recession of the coast line in..... 221
—, Reclaiming the land in..... 222
HOMOLOGRAPHIC projection, Invention of..... 38
HOVEY, ESTHER LANCRAFT; Old post-road from Tiflis to Erivan 300
HOVEY, E. O., Work of..... 346
HUBBARD, JAMES MASCARENE; Singan—The present capital of the Chinese Empire..... 63
—; The Tsangpo..... 32
HUBBARD Memorial Building..... 356
HUMAN antiquity in Asia..... 289
— progress, Course of..... 287
HUMBOLDT referred to..... 145
HYDROGRAPHIC OFFICE, Work of U. S... 337

ICE caves..... 433
— in southern latitudes..... 439
INDIA, Census of..... 158
—, Native surveyors of..... 35
INDIAN tribes of southern Patagonia; J. B. Hatcher..... 12
— village of Baum..... 272
— —, Review of book by J. A. Udden on an old... 165
INDIANS, Papago, Customs of..... 103
—, The Seri..... 278
ISTHMIAN CANAL COMMISSION, Report of..... 28, 441

JAMAICA, African language in..... 164
JAPAN AND CHINA—Some comparisons; Harrie Webster..... 69
JOHNSON, WILLARD D., referred to..... 278, 409
JUDD, S. D., Note of report on sparrows by..... 410

KENNAN, GEORGE, referred to..... 315
KIMBALL, H. H., Reference to paper on ice caves by 433
KODIAK, not Kadiak; Marcus Baker..... 397
KOLLM, GEORG; German South Polar Expedition.. 377
KONGO Basin, Exploration of..... 148
KOZLOFF, LIEUT., Note on expedition to central China by..... 405

LANGLEY, S. P., Notes from a diary of a trip to Tahiti..... 413
—, Report on Smithsonian Institution by..... 410
LATIN-AMERICAN constitutions and revolutions; John W. Foster..... 169
LE CONTE, JOSEPH, Obituary note on..... 309
LIGHTNING, Property loss by..... 82
LINK relations of southwestern Asia; Talcott Williams..... 249, 291
LITTLEHALES, G. W., Record of address by..... 88
— referred to..... 83
—; Survey for a cable to the Philippines..... 48
LIVINGSTONE'S explorations..... 149
LOMBROSO, CESARE, cited on China..... 206
LOW, SETH, referred to..... 357, 440
LUCAS, A. F., Discovery of oil in Texas by..... 277
LUCAS, F. A., Review of book by 444

MCADIE, ALEXANDER, Abstract of paper by..... 108
MCGEE, W J; Asia, the cradle of humanity 281
—, Book reviews by 207, 442
—; Col. F. F. Hilder..... 85
—; Ice caves and frozen wells..... 433
—; Joseph Le Conte..... 309
—, Muñiz collection exhibited by. 242
—, Record of addresses by..... 166, 448
—; The old Yuma trail 103, 129
—; The Seri Indians..... 278
—; Work of the Bureau of American Ethnology... 369
MCKINLEY, Mount; Robert Muldrow..... 312

Page

MCKINLEY, President, In memoriam of..... 350
MANCHURIA, American interests in..... 270
MARQUESAS Islands..... 415
MARTIN, W. A. P., Record of address by 88
—; The siege of Pekin 53
MATTHES, GERARD H.; The dikes of Holland..... 219
MEAKIN, BUDGETT, Review of book by..... 208
MENDENHALL, W. C., Work in Alaska by..... 206, 399
MERRIAM, C. HART, Editor of Harriman Alaska publications..... 199
—, Reference to work of..... 206, 405
METEOROLOGICAL science, Development of..... 362
MEXICAN boundary survey..... 146
— cession, First..... 376
MEXICO, City of..... 178
—, Department of foreign affairs in..... 154
—, Factories of..... 176
—, John W. Foster on..... 159
—, Maps of..... 247
—, Mining in..... 157
— of today: Juan N. Navarro..... 152, 176, 235
—, Public education in..... 156
—, Roads in..... 177
MIDNIGHT sun in the Klondike; Alice Rollins Crane 66
MILLS, WM. C., Indian exhibit at Buffalo Exposition by 272
MINING and mineral resources of the United States. 407
MISSING link, Discovery of the..... 286
MOLLWEIDE, C. B., inventor of homolographic projection..... 38
MOORE, WILLIS L., referred to..... 81, 127, 362
—, Review of book by 126, 248
—; The Weather Bureau..... 362
MOORS, Review of book on land of the..... 208
MUIR, JOHN, Review of book by..... 444
MULDROW, ROBERT; Mount McKinley..... 312
MURAVIEFF, N. N., Explorations along the Amur by 318
MURRAY, JOHN, Oceanographic work of..... 150, 238

NAIN SINGH, Explorations of..... 34, 147
NANSEN referred to..... 144, 202, 342
NAVARRO, JUAN N.; Mexico of today 127, 152, 176
NEGRO element in the United States..... 385
NEUMANN, OSCAR, Note on African exploration by 407
NEWEST ENGLAND, Review of Demarest's book on 165
NICARAGUA and Costa Rica, Boundary between.... 22
NICARAGUA Canal, The..... 28, 441
NINETEENTH century, Geographic progress during..... 143
NORDENSKJOLD, ADOLF ERIK, Death of..... 348
NORDENSKJOLD, OTTO, Leader of Swedish South Polar Expedition 144, 204, 406
NOME, Cape, Origin of name of..... 398
NORTHERN lights, The; Alice Rollins Crane..... 69
NORTH Polar Expedition, The first known..... 324
NORTHWEST boundary of the United States..... 161

OIL fields in Texas and California..... 276
OLD Yuma trail, The; W J McGee..... 103, 129
OREGON Territory, Boundaries of..... 374
ORLEANS, HENRI OF, Death of..... 346

PACIFIC cable, A..... 6
— Coast, Natives of..... 20
— Railway Route survey..... 146
PAGE, JAMES; Drift of floating bottles in the Pacific Ocean 337
— referred to. 438
PAPAGO Indians, Customs of..... 103
PARK, MUNGO, Explorations of..... 148
PARKER, E. W., Report on coal output by..... 348
PATAGONIA, southern, Indian tribes of..... 12
PEARY, JOSEPHINE D., referred to..... 202, 361
PEARY, ROBERT, Arctic work of..... 144, 202, 357, 448
PEKIN, Causes leading to the siege of..... 53
PERU, Chile's dispute with..... 401
PETERS, W. J., Alaska expeditions by..... 206, 399
—, Record of address by..... 88

Page

PHILIPPINE exhibit at the Pan-American Exposition ... 119
PHILIPPINE Islands, American progress in ... 405
— —, Forests of ... 47
— —, Harbors and highways of ... 116
— —, Map of ... 406
— —, Ownership of land in ... 115
— —, Telegraphs in ... 6, 405
— —, Weather service of ... 248
PHILLIPS, P. L., List of American maps by ... 409
PIKE, GENERAL, Explorations by ... 146
PINCHOT, GIFFORD, Record of address by ... 88
PLATEAU barometry of the United States ... 127
PORTO RICO, Census of ... 80
—, Charting the coast of ... 45
—, Telegraph system in ... 5
POWELL, J. W., cited on African language in Jamaica ... 164
—, Researches among Indians by ... 284
PULLAR, LAURENCE, Survey of English lakes by ... 408
PUTNAM, G. R., Charting harbors of Philippines by ... 125

QUERINI, FRANCO, Search for ... 44, 380
QUITO, Remeasurement of the arc of ... 316

RACES of Asia ... 283
RAILWAY, Australian ... 313
—, Suspension, in Germany ... 162
—, Trans-Siberian ... 44, 206, 322
RECIPROCITY Treaties, Report on ... 440
REDWAY, J. W., Review of book by ... 446
RICHTHOFEN, VON, referred to ... 330, 351
RIVER profiles ... 314
ROYAL GEOGRAPHICAL SOCIETY ... 160, 247, 339
RUSSIAN Monroe doctrine ... 323

SALT deposit, A remarkable ... 391
SAN MORINO, Republic of ... 199
SAVILLE, M. H., Record of address by ... 88
SCHOTT, C. A.; Recent contributions to our knowledge of the earth's shape and size ... 36
—, Record of address by ... 88
SCIDMORE, ELIZA R., referred to ... 352, 403
SEA fogs of San Francisco; Alexander G. McAdie. 108
SERI INDIANS, The; W J McGee ... 278
SERVIA ... 241
SIBERIA, The resources and future of; Edwin A. Grosvenor ... 317
—, Development of ... 78
— Railway ... 44, 206, 322, 438
SIGNAL CORPS, U. S., Work of ... 5, 405, 406
SINCLAIR, C. H., Work on northern boundary by ... 162
SINGAN, A Chinese capital ... 63
SMITH, DONALDSON, Expedition of, in central east Africa ... 42, 247
SMITHSONIAN INSTITUTION, Report of, for 1900 ... 286
SONOYTA—The Sump of ... 133
SNOWFALL, Effect on water supply of ... 124
SOUTH AFRICA, Military operations in ... 409
SPENCER, A. C., Record of address by ... 127
SPITZBERGEN, Russian expedition to ... 404
SQUIER, GEORGE O.; Influence of submarine cables upon military and naval supremacy ... 1
STANLEY-BROWN, JOSEPH, Record of address by ... 88
STATISTICS, BUREAU OF, Treasury Department, Reports by ... 402, 409
STEIN, ROBERT, Polar expedition of ... 380
STEPHENS, H. MORSE, Record of address by ... 166
SUBMARINE Arctic boat ... 201
— cable systems ... 8, 163, 315
SUEZ Canal, Traffic on ... 380
SVEN HEDIN'S explorations in central Asia ... 45, 393
SVERDRUP, No news from Captain ... 380
SWITZERLAND, Population of ... 205

TAFT Philippine Commission, Report of ... 114
TAHITI; by S. P. Langley ... 413
TEALL, J. J., Director of British Geological Survey. 163
TEHUELCHES, So-called race of giants ... 12

Page

TELEGRAPH, British Yukon ... 164
—, Cape to Cairo ...
—, Philippine military ... 6
— system in Cuba and Porto Rico ... 5
—, The Alaskan ... 6
TERRITORIAL acquisitions, Boundaries of ... 373
TEXAS, Lost Boundary of ... 430
—, Northwestern boundary of ... 376
—, Oil fields of ... 276
TIBET, Explorations of ... 33, 147, 403
TIERRA DEL FUEGO, Indian tribes of ... 12
TIFLIS and Erivan, Old post-road between ... 300
TITTMANN, O. H., referred to ... 37, 161, 373
TODD, W. E. C., Field-work of ... 314
TOLL, BARON, Arctic work of ... 404
TOWNSEND, CHARLES H., Compiler of Fish Commission records ... 410
TSANGPO, The; James Mascarene Hubbard ... 32

UDDEN, J. A., Review of book by ... 165
UNITED KINGDOM, Population of ... 240
UNITED STATES, Agricultural exports of ... 380
— —, Boundaries of ... 161, 373, 441
— —, Center of population in ... 241
— —, Chinese, Japanese, and Indians in ... 388
— —, Coal output of ... 348
— —, Colonial telegraph system for ... 5
— —, Commercial relations of ... 244, 402
— — Consular list ... 315
— —, Death rate in, in 1900 ... 401
— —, Foreign born in ... 385, 441
— —, Immigration to ... 383, 403
— — Institutions which promote geographic research ... 355
— —, Literacy of men of ... 437
— —, Mapping of ... 123
— —, Males and females in ... 388
— —, Mineral products of ... 407
— —, Sex, nativity, and color of people of ... 381
— —, Urban population of ... 345

VENEZUELA, Revolution in ... 171
VICTORIA, Exploration during reign of ... 160
VIENNA, Recent census of ... 164
VLADIVOSTOK, terminus of the Siberian Railway ... 319

WAINWRIGHT, D. B., Record of address by ... 88
WALLACE, Scientific work in the Amazon Basin of ... 145
WALKER, J. G., referred to in connection with Nicaragua Canal ... 26
WARD, R. DE C., Referred to ... 409, 440
WATER supply, Effect of snowfall on ... 124
WEATHER BUREAU, The; Willis L. Moore ... 362
— —, Work of ... 81, 108, 124, 127, 164, 248
WELLBY, CAPTAIN, Review of Abyssinian book by ... 443
WELLMAN, WALTER, Plans for Arctic work of ... 202, 233
WHITE, ANDREW D., Referred to as delegate to Geographic Congress ... 352
WILCOX, W. D.; Work in Canadian Rockies ... 439
WILCOX, WALTER F., Summary of conference on United States boundaries by ... 373
WILDE, AUGUSTUS B., Review of book by, on modern Abyssinia ... 274
WILLIAMS, TALCOTT; The link relations of southwestern Asia ... 249, 291
—, Record of address by ... 166
—, referred to ... 282, 203
WILLETTS, GILSON, Record of address by ... 166
WILLIS, BAILEY, Work on northwest boundary ... 162
WILSON, H. M., Referred to ... 123
WINES, H. F., Record of address by ... 448
WORLD routes ... 321
WYOMING, Oil fields of ... 278

YANGTZE Valley, Great Britain in ... 163
YELLOW Fever, Conquest of, in Habana ... 440
YOSEMITE Valley, Origin of ... 86

ZUIDER ZEE, Draining the ... 314, 439
—, Formation of the ... 221

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